ELECTRICAL REVIEW

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The New Wood Arc-Light Dynamo Electric Machine.

The Fort Wayne Electric Company, formerly the Fort Wayne Jenney Electric Light Company, in addition to its large factory in Fort Wayne, Ind., has for several months past been operating a large factory at 211 Navy street, Brooklyn, N. Y. The well-known electrical inventor, Mr. J. J. Wood, who invented the system formerly operated by the Fuller-Wood Company, afterwards by the American Company, has been in charge of the experiments and work at this factory. A new and perfectly automatic arc light dynamo and improved arc lamp are the results of Mr. Wood's work since taking charge of the factory in Brooklyn. The dynamo regulates from a short circuit up to 20 per cent. above its rated capacity. At the time of the visit of the representative of the Review the first dynamo, which worked perfectly from the start, had just been put together and was being tested. It is a 60 lighter and gives 3,500 volts, and was seen to regulate from a short circuit up to 78 lamps, and this without sparking at the commutator. The automatic regulator is shown in the apparent form of a solenoid and a series of different sized cog-wheels on the end of the dynamo, and is said to be an entirely new departure and is certainly very effective in its work. Mr. Wood is proud of the fact (and has every right to be) that the machine was all worked out theoretically, the parts made, and when assembled the first time the dynamo's work gave perfect satisfaction.

The following data are given for two of the sizes of the dynamo, which is to be built in eight sizes, from one arc light up to 120 arc lights. The 50-light machine, each light of 1,200 candle power, will require 26 horse-power and weigh 2,800 pounds, the floor space being 21x50 inches. A 50-light dynamo, each light of 2,000 candle power, will require 35 horse-power, weighing 3,800 pounds, and have a floor space or 24x55 inches. The armature of the smaller dynamo makes 925 revolutions and the larger 875 revolutions. The new arc lamp which goes forth with this new dynamo possesses several improvements in detail, the chief of which is simplicity and economy in construction.

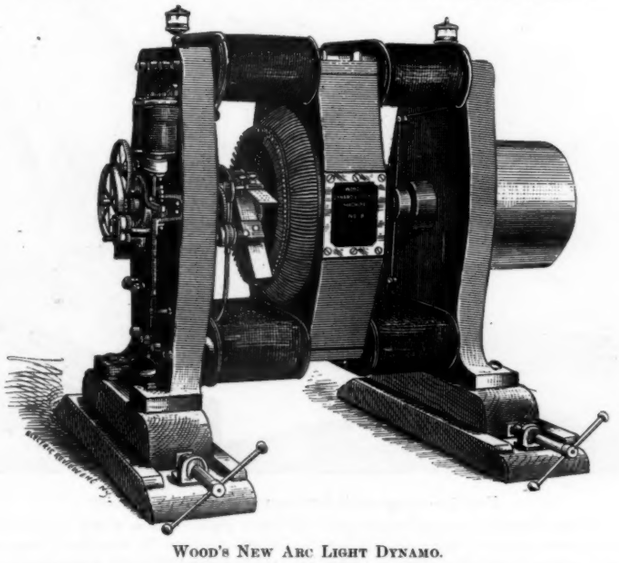
We think the arc lighting fraternity will find this new invention a very interesting machine. The work of filling orders will begin at once, and the Fort Wayne Company soon expects to have this improved arc system in the field at work.

E. L. Condon, of Malden, Mass., is in Boston exhibiting before the various railroad superintendents his patent electric switch. The system is interlocking. Large storage batteries are placed in a tower at each end of the switching yard and small, magnetic coils are placed at every switch. The switches are operated by means of a key board in a tower. The pressing down on the key produces an instantaneous switching of the rails which return to their original place when the pressure is removed from the key. By this system, it is claimed, a dozen switches can be operated at once. An automatic record is kept of each train switched.

The Hall Process for the Manufacture of Aluminum.

It may be interesting to know that the latest developments in the manufacture of aluminum have been made in Pittsburgh by the Pittsburgh Reduction Company, which has been for some time making this metal under the patents of Charles M. Hall, of Oberlin, Ohio. The Hall process is one whereby the metal is reduced directly from its oxide, alumina, by electrolysis.

In decomposing alumina into its elements, aluminum and oxygen, by means of an electric current, the problem has been to furnish a solvent which would be less acted on by the electric current than the ore, alumina. By the Hall process, this problem has been solved. The alumina is dissolved in a bath of diffused metallic flourides and is then decomposed into aluminum and oxygen by means of an electric current, the bath remaining unchanged, more alumina being added as the process of reduction goes on, thus making the process a continuous as well as a direct one.



Wood's New Arc Light Dynamo.

The two dynamos are connected in multiple arc, and the current furnished is conducted on heavy copper bars to the pots, which are connected in series, so that the whole current passes through each pot. These pots are iron boxes which are heavily lined with carbon and contain the electrolyte of metallic fluorides which is fused, and to which is added the ore to be reduced. The electric current passes through the electrolyte and decomposes the ore, causing the aluminum to deposit at the bottom of the pot, its specific gravity being greater than that of the electrolyte, while the oxygen passes to the positive pole. The circuit may be completed in two ways: First, by means of positive and negative electrodes, which are suspended in the bath from the heavy copper conductors; or, second, by means of positive electrodes suspended in the bath while the pot is placed in the circuit as the negative electrode.

When the current is turned on and the process is started, the only work necessary is to add more ore when that already in the pots is decomposed, and to remove the metal which has been deposited. The metal is either dipped out by means of a ladle or tapped out, and this is done without shutting off the current, so that the reduction is entirely a direct and continuous process. A voltmeter is connected to each pot, and indicates the conditions of the pots by the varying resistance. As the ore becomes exhausted the resistance increases, and more ore is charged.

The theoretical amount of aluminum that should be reduced, as calculated from its electro-chemical equivalent, is one pound per hour for every 1,428 amperes, and practice has given almost the full theoretical amount.

The Mercer Motor Company, Omaha, Neb., has decided to build a new power house, to be supplied with four 800 horse-power engines. The present power house will furnish electricity to drive 52 trains.

The Daft electric street car is being given a trial in Plainfield, N. J. The system will probably be adopted.

The railroad over the Troy and West Troy, N. Y., bridge will be ready for the electric cars the latter part of this month. Tracks are now being laid on both approaches to the bridge. The tracks on the bridge, which were laid some time ago to save the planks, are too wide for the cars, and one side of each track will be set in, between one and two inches. The wires for the cars crossing the bridge will run under the planks. The cars will run across the Troy and Lansingburgh tracks at River street, and will connect with the tracks of the Albia road on Congress street. The road will terminate at the switch, about 200 feet from River street. Passengers may take cars at River street for Albany, as the bridge road will connect with the Watervliet railroad at West Troy.

The Telephonists of the East Set Their Faces Westward.

HANDSOME TREATMENT BY THE CHICAGO COMPANIES.

MINNEAPOLIS INVADED TUESDAY MORNING.

(Special Dispatch to Electrical Review.)

Chicago, Ill., September 9.—The trip of the telephone party, in its special train, from New York to Chicago was greatly enjoyed. The careful attention of Secretary Barney kept everything running smoothly, and the Pennsylvania railroad officials saw that every possible comfort was extended.

Secretary Barney was presented with an elegant diamond scarf-pin just before reaching Harrisburgh by a few of his New York friends, and taken completely by surprise.

The Chicago and Central Union Telephone Companies, through those good fellows, Frank Beach and Chas. Wilson, have finely entertained the party. An elaborate informal lunch was served in the rooms of the Electric Club on Adams street. If the World's Fair is held here the East need not fear but what good things to eat will be provided.

After the lunch, which was discussed in the pleasant and lively manner characteristic of the electrical fraternity, the party was taken over the city in carriages and the Garden City put on exhibition.

The whole entertainment here has been most appropriate and successful, and the hospitable Chicago telephonists are to be congratulated.

From here the party leave in a few moments for Minneapolis.

LIST OF PASSENGERS ON THE SPECIAL "TELEPHONE LIMITED" FROM NEW YORK TO MINNEAPOLIS.

Adams, Abner S., director, Erie Telephone Co.; Adams, Mrs. Abner S., Lowell, Mass.

Adams, Charles E., director, Erie Telephone Co.; Adams, Mrs. Charles E., Lowell, Mass.

Bailey, R. M., general manager, Central Pennsylvania Telephone and Supply Co., Williamsport, Pa.

Baker, Cyrus O., Jr., Baker & Co. (platinum), Newark, N. J.

Barney, Gen. C. H., secretary, National Telephone Exchange Association; director, Domestic (Newark, N. J.) Telegraph and Telephone Co.; treasurer, Sawyer-Man Electric Co.; Barney, Mrs. C. H., New York, N. Y.

Brown, James M., special agent, American Bell Telephone Co., Washington, D. C.

Carty, John J., electrician, Western Electric Co., New York, N. Y.

Clark, Joel C., secretary and treasurer, New York and New Jersey Telephone Co.; secretary and treasurer, New York and Pennsylvania Telephone Co.; Clark, Mrs. Joel C., New York, N. Y.

Davis, Joseph R., general manager, Pennsylvania Telephone Co., Harrisburgh, Pa.

(Continued on page 5.)

The New Station of the Edison Illuminating Company, of Brooklyn.

One of the conspicuous features to be seen in the neighborhood of City Hall, Brooklyn, are the tall towers of the new Edison station, which is located on lots 358 to 362 Pearl street. The building has been erected in the short period of 90 days, and is probably the most complete of its kind, being entirely fire-proof in every respect.

The work of furnishing light began on Monday of last week. Although the building is not quite completed, it will be entirely finished in a few weeks under the active work of the contractors, Messrs. J. & L. Weber, of New York City.

Our readers are all aware of the great opposition which this company overcame in securing its rights in Brooklyn, and this building is an evidence of the faith of the projectors in the business of incandescent lighting in the City of Churches. Dr. Eugene Crowell is president of the company; Mr. C. E. Chinnock, vice-president; Mr. R. C. Peabody, secretary and treasurer, and Mr. C. J. Field, formerly chief engineer of the Edison United Manufacturing Company, is the general manager; and to his intelligent and careful supervision the excellent features of this new station may be attributed. He has a very efficient staff of young men with him, and is himself quite a young man to hold such a responsible position. The station will be operated by him, assisted by the following-named gentlemen: W. S. Barstow, superintendent of electrical plant and underground work; E. J. Cook, superintendent of steam plant; F. Uhlenhout, Jr., electrician; H. H. Pollard, superintendent wiring department; G. L. Morse, consulting architect.

A brief description of the station will interest every practical electric light man. The two stacks are 160 feet high, and on the top of each will be placed a large incandescent lamp of 300 candle-power, and as the stacks are the highest in Brooklyn, these lights will be seen over the greater part of the city. The steam plant consists of 12 Ball engines of 300 horse-power each, each engine weighing 18 tons, and eight Babcock & Wilcox boilers of 430 horse-power each. The engines are compound, high speed, and are the latest development in this class of engines for electric light work, and are expected to produce higher results in regard to economy than anything ever before attempted. The contract for these engines is one of the largest ever given to any engine firm, and was taken by Messrs. C. R. Vincent & Co., 17 Cortlandt street, New York. The steam pressure will be 150 pounds and an economy of three pounds of coal per horse-power per hour will be obtained. Nothing has been neglected in perfecting the arrangements of the steam plant as far as human ingenuity goes, and there is no possibility of a break down, everything being in duplicate even to the steam piping.

At the time of the visit of the representative of the REVIEW Mr. Ball, the young inventor of this very efficient engine, was present, personally assisting in the work of starting the engines.

The electrical plant is to consist of 24 dynamos of 1,500 lights each, each dynamo weighing 10 tons. They are of the latest type of Edison machine. In the dynamo room, which is on the second floor, is arranged the electrical apparatus which controls all the machines in this room and also all the outside lines. The Edison underground system, as at present installed, includes 25 miles and covers quite a large and important district, which will be extended as the business demands. There are no overhead lines in use. The company will have its general offices, work shops, show rooms and supply rooms located on the top floor of the building. In all its details this building represents the latest type of developments in the electrical field. It is thoroughly equipped, elevators run with electric motors, force draft for boilers, Davidson steam pumps, etc., go to make up one of the most complete stations that has ever been installed.

The company already has over 7,000 lamps contracted for, and is now running four dynamos and connecting up patrons as rapidly as possible. Among the many places that have already been wired for the incandescent light are the Park Theatre, Pierrepont House, Commonwealth Lodge, Young Men's Christian Association, Packer Institute, Brooklyn Tabernacle, Balch, Price & Company, and T. K. Horton & Company.

Electricity versus Gas.

The establishment of electric lighting and power companies at Belfast, Me., and Leominster, Mass., has been successfully accomplished in the face of active opposition from the existing gas companies, and the companies are now officered and managed by most capable men who will not suffer their best interests to lag. The Belfast plant is operated from a water power situated one and one-half miles out of the city. The machinery used is the Thomson-Houston arc dynamos and the Thomson-Houston alternating current incandescent dynamos. The motors are run from the arc circuit and are manufactured by the Excelsior Electric Company, and additions to the plant, both in motors and lights, are being constantly made. The company has ample water power at its command, having a first privilege capacity of 150 horse-power every day in the year from seven o'clock in the morning until midnight, and a second privilege of 200 horse-power more which can be easily made use of if desirable. The Electric Company has established a mill in the city for grinding grain, and is doing a large and successful business in this line; they use the Odell Roller Mill and it is working satisfactorily. Small motors are used in various parts of the city and with good success.

The gas company there, as in all other places, is making a strong effort to keep the Electric Company out, but the citizens demand a better light than they have been receiving from the gas company. The city itself is still lighted with gas, but will probably make a contract at no distant day for arc and incandescent lights on the streets.

The Belfast Company has one of the most promising outlooks for financial success of any plant of its size in its vicinity. The expense for operating the same will be low and the wants of the city will undoubtedly bring large patronage.

The Leominster Electric Light and Power Company, using the Thomson-Houston system, is now in successful operation. The entire lighting of the city has been awarded to this company and the demand for incandescent lamps is very large.

The Leominster Gas Company, of course, is making low bids to retain its customers, but the customers say that they want electricity. The system used is the Thomson-Houston arc and alternating. This company will also supply the power for the new Leominster and Fitchburg street railway.

The plant is controlled by leading citizens in Leominster, Mr. E. A. Buffington, a large shirt manufacturer, being the president, and Mr. Hamilton Mayo, president of the bank, the leading attorney of the town, the treasurer of the company. The capital stock is $80,000, all of which has been subscribed for and paid in, and a meeting has been called to increase the capital stock of the company for the purpose of enlarging the plant. The results of the first month's run of the company shows that it starts off with a business which will show six per cent. on its capital.

Electric Signals at Railroad Crossings.

The Western Maryland Railroad Company is placing at the principal crossings along its route a magneto-electric alarm signal, which gives notice of the approach of a train by the vigorous ringing of a gong. The patent is owned by the Pennsylvania Steel Company, which has recently established works at Sparrow's Point. Experiments are now being made by some of the Western Maryland men looking towards an improvement on it. By the use of this apparatus all trains automatically announce their approach 20 or 30 seconds previous to their passage across the highway. The gong continues its warning strokes until a train has passed. The action of the gongs is effected by electricity generated by a compact and substantial electric machine of the magneto type fitted in strong iron cases, which are placed alongside the tracks at the required distance from the crossing. These generators have a train of gearing, with fly wheel, actuated through a powerful spring mechanism by a lever which stands slightly above the surface of the rail, so as to be depressed by every passing wheel, which has a "tread" wider than the rail. It is very simple, and no materials are required to maintain it except oil for lubrication. It generates its own electricity as it is required, and only by the movement of the train or locomotive.

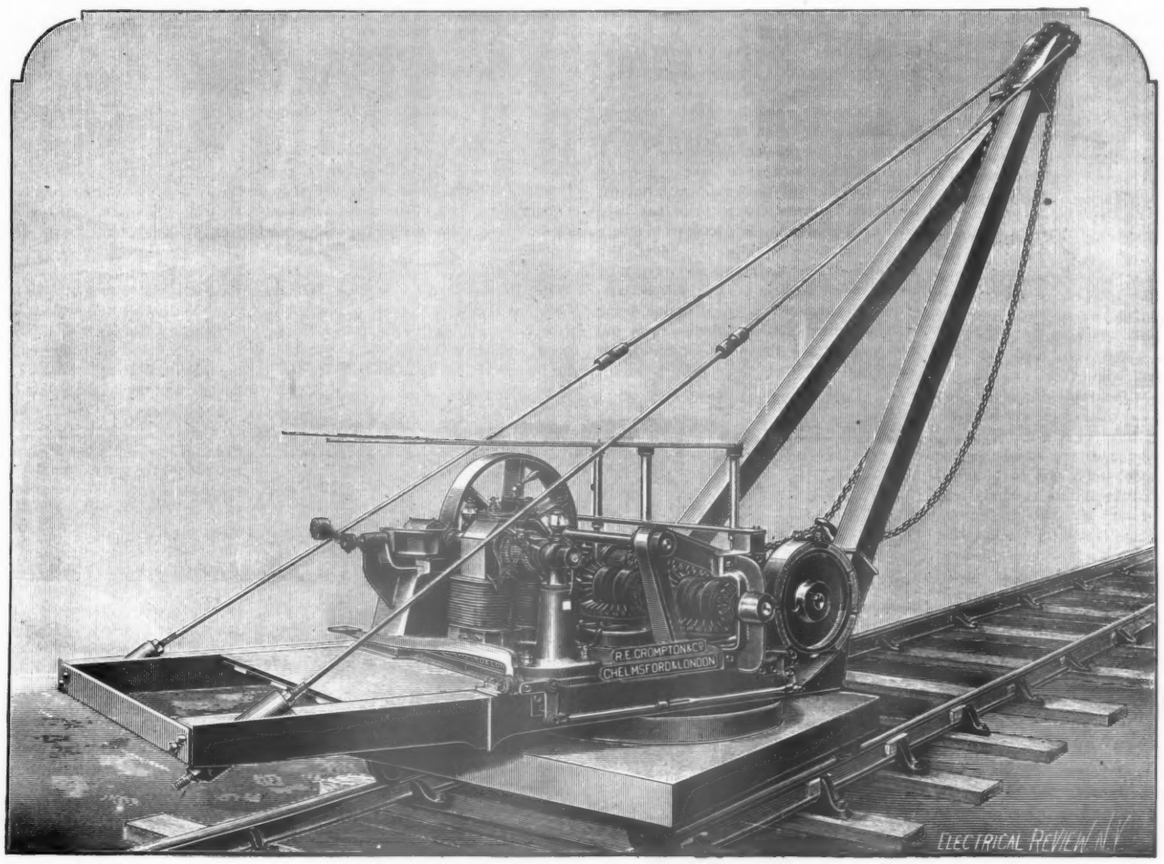


FIG. 1.—CROMPTON'S DYNAMO AND ELECTRIC CRANE.

Crompton's Recent Electrical Work.

We illustrate in this issue of the REVIEW the new "Trade" dynamo and electric crane built by R. E. Crompton & Co., of London. The crane and dynamo were described by our correspondent at the Birmingham Exhibition in the REVIEW last week. We are indebted to our enterprising contemporary, *Electrical Plant*, for these illustrations. The demand for the crane is reported quite large. The dynamo is described somewhat in detail by our contemporary as follows:

Armature Core.—Built up of laminated iron discs composing the core, every other disc being insulated from its neighbor by paper and specially prepared varnish. The whole is then carefully dried in an oven at a high even temperature.

Spindle and Radial Bars.—The spindle is of steel, ground longitudinally for three, four or six aluminum bronze radial bars, one side of which fits in these grooves, the other into dovetailed notches in the discs.

Armature Winding.—This is of the Gramme type, driven by steel teeth projecting from the circumference of the armature coil.

Magnets.—Of best annealed wrought iron, accurately fitted to bed-plate and secured by turned bolts and nuts in a vertical position.

The bed-plate is of cast iron and is planed; cast-iron bearings are also provided, pushed with white metal. The cross-bar is of cast iron, and the brush spindles of gun metal; the brushes are made out of stencil copper.

This machine is compound wound, and gives an output of 225 amperes at 110 volts, the speed being 550 revolutions.

Electricity in Coast Defence.

Lieutenant W. R. Hamilton writes in *St. Nicholas:*

Electricity plays, perhaps, the most wonderful part in all these huge works. Not far from the main fort, there would be built a little round building. This would be the place for the "tower of observation" of the commanding officer. From here he could see all over the harbor and away out to sea. The tower would be strong, and inside would be the wonderful key-boards of the electric system. By means of these, the commander could telephone to the captain of any battery to load his guns, and aim them at such and such an angle and direction. The captain of the battery would do so and telephone back the moment he was ready. The commander could tell the captain to fire, or he could, if he chose, press a little key and himself fire each gun singly or all the guns at once. He could do the same with all the batteries and forts, and he could, from his little tower miles away, by a light touch of his finger, explode every gun in the harbor, and send tons and tons of metal flying with crushing force at any vessel he pleased. He could do even more. He could explode any, or all, of the mines and torpedoes at once, or he could have one grand simultaneous explosion of all the guns, torpedoes and mines. At each fort and battery would be stationed officers who by means of instruments would find exactly the course of the enemy's ships. This would be telegraphed to the commander, who would thus know at every instant just where any vessel is, and how fast she is sailing. So he could predict that a ship will pass a certain spot at a certain time, and, if she did not change her course, could press the key and blow up the vessel, or send at her a huge bolt of iron or steel. If the enemy had landed a force on the main land down the coast, and it was marching on the fort to take it in the rear, the commander could wait till he saw the force on a road approaching a fort, when, pressing another key, several iron doors of the fort would open and automatic machine-guns pop out, and commence firing at the rate of 600 shots per minute apiece, and keep it up till the key was pressed again, when they would withdraw and the shields close. It can be seen that the commander should know absolutely all that is going on, otherwise he might fire into his own forts, or on his own naval-boats.

Minneapolis, Minn.—The Riggs Electric Danger Signal Company has changed its name to the Riggs Electric Signal Company and increased its stock from $3,000,000 to $4,000,000.

Lighting of the Navy Yard at Washington.

The specifications which were drawn up by Commander Bradford, the naval inspector of electric lighting, for the one hundred and twenty 2,000 candle-power arc light plant to be installed at the Navy Yard, Washington, are probably the most complete specifications of the kind ever issued. They call for the very best and most expensive apparatus, engines, line wire, iron poles and workmanship.

Four voltmeters, registering from 50 to 2,000 volts, are included, as are also amperemeters, rheostat with bridge, and galvanometer and tachometers; all of the latest and most approved and expensive patterns. The switchboard is to be of slate and to be furnished with connections necessary to place any one of six dynamos on any one or more of six circuits, or to cut out any circuit. In addition to this, the connections are to be so protected as to render it impossible for an attendant to make an accidental contact with any conducting metal. All switches and cut-outs are to be insulated, so that it will be impossible to receive a shock from them. The lamp posts are to be of iron tubing, tapered in length from the ground up, and similar in general design to those in the city of Boston. Metallic contact is to be broken at two sections in the length of the pole by insulating joints. The

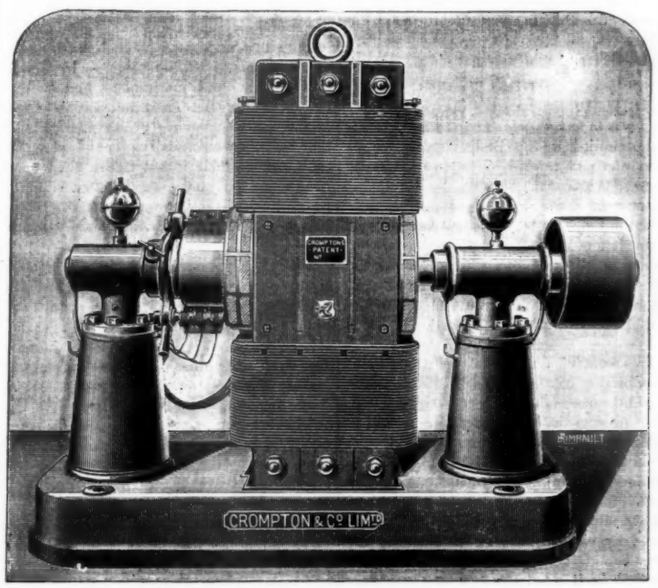


FIG. 2.—CROMPTON'S TRADE DYNAMO.

belting and all appurtenances to the plant are to be of the latest and most approved pattern.

After a severe competition the contract was awarded to the Brush Electric Company, of Cleveland, Ohio, who, after they have installed the plant in accordance with the specifications and under the approval of the Government inspector, will no doubt turn over to the Government one of the most perfect and modern arc light plants of the day.

Well Lighted Buildings.

The Brush Electric Company, of Cleveland, Ohio, have finished and turned over complete to the New York Life Insurance Company all the large incandescent electric light plants installed by them in the New York Life Insurance Company's new buildings at Montreal, St. Paul, Omaha and Kansas City. These plants have a total capacity of 5,800 incandescent lights, the largest being the 3,000 light plant in the Kansas City building. No pains were spared either by the Brush Company or by the New York Life Insurance Company to make these plants as complete as any isolated plants in the country. The Watts-Campbell engines were used in Kansas City and Omaha, and the McIntosh-Seymour engines in St. Paul and Montreal. It is said that these New York Life Insurance Company office buildings are superior in every particular to any other buildings in the above cities.

French Tanners Using the New Process.

Attention was called to the above invention some time since in this paper.

The process of converting hides into leather, as now followed, consumes a space of time varying from six to 12 months. It also demands close attention and good management, as well as experience. Great care has to be exercised in the selection of material, else a lot of choice hides are found at the expiration of the tanning season to have deteriorated into second or even third quality leather. Tanners, and leather dealers generally, are accredited with being very careful and conservative in all their business methods.

With these facts in view it is not surprising that when it was reported from France that leather was being tanned by electricity, American tanners regarded the statement as a newspaper sensation. Twenty-four hours was considered pretty quick work for even electricity. It was not until the doubting Thomases had seen and felt that they believed.

The process is described by those who have seen it as a very simple one. The hides are placed in large cylinders, which revolve upon horizontal axles. The drum is filled with a decoction of tannin and closed. Provision is made for the passing of a current of electricity through the drum. The drum is kept slowly revolving until the process of tanning is completed. The length of time required varies with the nature of the hide. For the lighter skins, such as sheep and goat, which used to require from three to six months, by the electric process are tanned in 24 hours. The heavier hides, such as calf, ox, cow or horse, require from 72 to 96 hours. By the old fashioned bark process 12 months or even more would have been taken. The cost of production is greatly reduced by this method, for not only is the saving in time, but in labor. The actual cost of working is reduced over 50 per cent. By the bark process the cost of tanning is from seven to eight cents per pound of dry leather, as against that of three or four cents by the electric methods. And again, where a force of 50 men were required to produce a given quantity of leather, only ten are needed to produce the same by the new methods. Heretofore large capital has been required to run a tannery having a regular weekly output.

As hides often require to lie in the tan vats nearly a year, it will be seen that a great number must be in process of tannage in order that a certain amount of leather be turned out each week. In addition to extensive plant, heavy investments are represented by the hides in tannage. But the electric process completely revolutionized this. Hides purchased on Monday have been converted into leather and put on the market by Saturday.

Circleville, O.—The Circleville Electric Light and Power Company, Circleville; capital stock, $10,000.

Pomeroy, Ohio.—The Pomeroy and Middleport Electric Company, Pomeroy and Middleport; capital stock, $20,000.

Crawfordsville, Ind.—The Crawfordsville Electric Light and Power Company. C. M. Crawford, D. H. Jackson and H. W. Rinstine are the directors, and the capital stock is $200,000.

Chicago, Ill.—The International Electric Company, at Chicago; to manufacture electric apparatus; capital stock, $3,000,000; incorporators, Samuel W. Adams, Charles S. Raddin and Nathan Whitman.

Chicago, Ill.—The Metropolitan Electric Light and Motor Company, Chicago; to manufacture electric apparatus; capital, $500,000; incorporators, Samuel W. Adams, Charles S. Raddin and Nathan Whitman.

Albany, N. Y.—The United Edison Manufacturing Company, of New York City, has filed an increase of capital stock from $100,000 to $500,000. Henry Villard is one of the principal stockholders and a trustee of the company.

Oak Park, Chicago.—The Chicago Suburban Street Railway Company, with a capital of $125,000; the incorporators are S. Clendennin, E. E. Harbert and Anthony Schiller. At first they will be horse car lines, but later on electricity will be substituted.

Pittsburgh, Pa.—A charter was filed for the Tarentum Electric Light Company. The capital stock is $5,000, divided into 100 shares of $50 each. John W. Humphreys, A. L. Chapman, E. L. Thompson, Charles Buhl and Ellis W. Anchors, of Pittsburgh, are the directors.

Alexandria, Va.—The Richter Electric Construction Company has been incorporated, with Charles Richter, of Camden, N. J., president; H. L. White, of Somerville, Mass., treasurer, and A. G. Gray, of Brooklyn, N. Y., secretary. The capital stock authorized is $1,000,000.

Pittsburgh, Pa.—A charter was granted to the Brilliant Electric Light Company, of Pittsburgh; capital $150,000. The directors are A. H. Heisey, Eugene Ingold, Jas. P. Miller, A. C. Townsend and W. F. McCook. The company proposes to furnish electric light or power and have a bid in for lighting the City of Allegheny.

Sioux City, Neb.—The South Sioux City Electric Motor Company. The object of the corporation is to construct and operate a line of street railway in South Sioux City, Neb. The capital stock is $200,000; the incorporators are R. M. Bowler, Frank Hunt, J. M. Moan, Wm. Luther, Altee Hart and E. C. Palmer.

Blair, Neb.—The Blair Electric Light and Power Company, of Blair, Washington county, filed articles of incorporation with the Secretary of State. The capital stock is $300,000, divided into shares of 100 each F. W. Kenney, A. P. Howes, W. H. Palmer, F. M. Casetetter, F. H. Matthieson and W. C. Walton are the incorporators.

Kansas City, Kan.—At the meeting of the council in Kansas City, Kan., an ordinance was introduced granting to A. Mardis and Norton Thayer, of that city, a franchise to construct and operate a single or double track electric motor street railway in Armourdale. The provisions of the franchise compel the company to accept it within 60 days, and begin work within six months thereafter. The line is to be completed within two years.

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It is a well-worn adage that you "can catch more flies with sugar than with vinegar." Still the REVIEW is not run on that principle, nor can any self-respecting journal be so conducted.

The electric motor is now in successful operation between the extreme outlines of 102 American cities, while 78 more are preparing to introduce them. The Southerner's remark about the "Yankees coming down South first to emancipate the negroes and then the mules," really has a stronger application than at first appears on the surface. It begins to look, between the motors and the cable cars, as if the mule "must go."

Electrical interests in England are more active than ever before. The REVIEW's correspondent, in last issue, gave a comprehensive report of the Exhibition at Birmingham, as well as an interesting account of what is transpiring in electrical circles in London. In that great city there is an almost unlimited field for electric light and power, and this fact has evidently been discovered by enterprising electric light companies of America.

The meeting of the American Association for the Advancement of Science was formally opened the 28th ult., at Toronto, Ont, University. The association divided into eight sections, and proceeded to business. Before the section of physics, Vice-President H. S. Carhart, of Ann Arbor, read a paper dealing largely with the evidence in support of Maxwell's electromagnetic theory of light. He said he was confident that electricity and magnetism will yet be produced from sunlight.

This will be a great week for telephone men. They are sure of a hospitable welcome in that fine western city of Minneapolis.

From experiments made in Richmond, Va., with electric heaters it seems probable that a passenger coach can be kept warm at an expense of two cents an hour, the current being supplied by a dynamo on the locomotive or tender.

Nothing has been done on the installation at the Capitol, that Congress appropriated for last session. Attempts will be made next winter to secure sufficient appropriation to light the entire building, when bids will be let and the work rapidly pushed to completion.

The southwest will be well represented at the reunion of the United States military telegraph corps to be held in Louisville, Ky., September 11-13. Steps will be taken at the reunion to have Congress take action on the claims of the old army telegraphers for pensions.

The REVIEW desires to hereby thank its many friends who have sent it letters of commendation, stating their appreciation of its course since the Niagara Falls electric light meeting. And a great many new readers have come to us since then, often accompanying their subscription with kind words for the course of this journal. Unless we greatly mistake the sentiment, there is quite a general disgust over the action of the officers during the last session of the National Electric Light Association.

Mr. H. P. Brown, the electrical expert who was to have performed the first electrical execution in this State, is out with a card offering a reward for the party who, he alleges, broke open his desk and stole his papers and letters, part of which were published in the New York *Sun* of August 25th. These letters indicated that he was levying tribute in all directions and advancing the cause of science for a good substantial consideration. Under the circumstances no one can blame Brown for being mad.

It is worthy of note that the Hall aluminum process has now been published to the world, the patents having been finally granted. The process is so simple that if unforseen difficulties do not arise it would seem as if it were a valuable step towards the commercial manufacture of this metal. The oxide of aluminum is dissolved in a bath of melted metallic flourides and is then decomposed by electrolysis, the metal being deposited and the oxygen being set free. As the bath itself is not effected by the passage of the electric current and the oxygen at once escapes to the surface, it would seem that fresh ore could be added almost indefinitely. The limit of the process would seem to be measured largely by the cost of producing the current.

Rumors are flying about concerning a new type of engine or prime motor, and if true we are on the eve of a revolution in this field of invention. It is said that for the same coal bill more than double the present capacity of power plants can be attained. This is a sweet morsel of hope for the plant owner and will meet with many a hearty wish that it may not prove to be a rumor only. Think of doubling, or perhaps trebling the number of lights on a circuit (dynamo doubled or trebled of course, too), without ordering extra car loads of coal! Think of owning a 100 horse-power engine and being able to replace it with one of 200 horse-power or 300 horse-power with the same expenditure of fuel. Think of the effect on every branch of industry; the locomotive doubled in speed or halved in size; the steamship carrying present tonnage of coal and weight of engines and developing a speed of twenty-five or perhaps thirty knots per hour; or a cruiser of small tonnage showing her heels at the rate of thirty-five knots an hour. But the field is too vast to particularize. Yet we hear that all this is not only possible, but is on the eve of demonstration. We are quite skeptical ourselves, but are not prepared to deny the possibility.

TELEPHONE WORK.

In a quiet way the telephone systems of this country are receiving a great deal of attention from practical and skilled men. About five years ago the business in point of subscribers attained its highest point. Since that time there has been a gradual increase in some of the larger exchanges, and a falling off and in some cases entire shutting down of smaller exchanges. The telephone people can now work upon a well-defined basis. They have discovered how long apparatus will last and just how often aerial wire will have to be renewed. The great uncertainty that confronts them now is met with in underground work; there they have but little past experience to guide them and cannot tell with any degree of certainty how long an expensive conduit system of cables may be depended upon to do good work.

Another problem is in the switchboards. There has been very great improvement made in this direction, the most desirable of course being the multiple-switchboard, and it has been greatly improved since its introduction about four or five years ago. Still it seems to leave room for improvement, for the greatest care apparently does not obviate dust getting in and preventing good contact all along the line of the multitudinous contacts which go to make up the multiple system.

The rapid development of electric lighting and electric power, and the extension of heavy wires carrying the strong currents required for these systems, has called the attention of the telephone people to another risk, that of interference in the work of the sensitive telephone by means of induction or by a cross wire burning out instruments and switchboards. There was great indignation at first on the part of telephone people who claimed that the other electrical branches were encrouching on their vested rights, but we are pleased to say that now a better feeling is prevailing and that the representatives of the branches of this great industry are working together for the general benefit of all.

The greatest development in telephone circles the past year or two has been brought about by the work of the American Telephone and Telegraph Co., on its long distance system. Long distance telephoning is the most interesting and most promising feature of all electrical work to-day, and its limits are continually being extended.

The Convention at Minneapolis this week is well attended, and the programme which we publish gives an excellent idea of the good work the Convention will do. The REVIEW extends its compliments to this industrious and progressive electrical fraternity, and hopes they may have continued prosperity.

IN WHAT DEGREE IS ELECTRICITY DANGEROUS?

The dynamite explosion at Antwerp, Belgium, in which three hundred persons were killed and over five hundred were injured, news of which reached this country Sept. 7, well illustrates the fact that the incalculable benefits of modern civilized life are only to be purchased with the price of eternal vigilance; and even then the gain of the many is often obtained by the woes of the few.

High explosives have been necessary to the great engineering feats of the last twenty years, and without them the great geographical barriers of the world would still prevent that unity of commercial and industrial purpose which makes possible such a nation as the United States, and which will, in history, mark the present age as the fulcrum upon which human thought has applied the lever of common effort to lift human life onto its highest plane.

Heretofore electricity has found its only usefulness in the transmission of thought: now it is finding a use in the transmission of matter; and there are those who believe it will one day be the universal means for the locomotion of people and things.

With this comes the same degree of danger which always accompanies the widespread introduction of an unfamiliar force. Those who advise the public that the commercial electric currents of to-day are safe things for children to play with, are either ignorant of the facts or over-zealous to hide the head of their ostrich of error, in the sand of misinformation, from the gaz of public opinion.

He who would protest against electricity as it is used to-day should offset against its danger to life, as shown by the actual number of deaths known to have resulted from it, the advantages and gains to the public weal of which it is the evident cause.

There will always be those who will cry out against it, but their efforts will be as useless as those of King Canute, who, sitting on the sea shore, bid the tide not to rise; or of the good old lady who tried to keep the ocean out of her kitchen with her mop.

ELECTRICAL NEWS.

Boston, Chicago, London and Other Points.

OUR LONDON LETTER.

The Paris Academy and Edison.—Mr. Edison's stay in Paris is far more lengthened than was expected, and Birmingham Exhibition still lacks the additional, and which will assuredly prove the greatest, source of its popularity in the presence of the master mind of electricity. The *Daily Telegraph* bestows numerous paragraphs upon his doings in Paris, and tells us that the little differences between him and the French savants have now been settled satisfactorily and completely by the visit of the American electrician to the Academy of Sciences. M. Janssen presented Mr. Edison to the assembled academicians, and he received the very heartiest of welcomes in a speech by the president, M. des Cloiseause, which was translated into English by M. Janssen. Before he left the Academy Mr. Edison promised to present a perfected phonograph to the Institute, with a sufficient number of cylinders to record the utterances of the members. A special library is to be fitted up to receive the phonographic apparatus, and future generations will thus be enabled to hear the very words of the savants who have passed away.

The Eiffel Tower Struck by Lightning.—During a recent storm the Eiffel tower was struck by lightning and a severe shock was felt, molten metal being said to have been seen to fall from the conductors; but very slight damage was done, and none whatever to the structure itself. A vase fell from its pedestal and was broken.

Electric Road at Birmingham.—An electric tram car service is about to be introduced in Birmingham, on the Bristol road; the work is being done by Elwell-Parker and the cars are to be of the Julien type.

Electric Lighting in Madrid.—There is considerable agitation in Madrid in regard to electric lighting, for which *Industries* accounts by the opposition of the French gas company who have the contract for lighting at nine shillings per 1,000 feet of gas, doing their utmost to prevent either the German or the English company, who appeared likely to move in the matter, taking any further steps. The rumor is that the German company have been offered £8,000 to retire, but as the English company is supported by Messrs. Murrietta, of London, it is hoped something may be done to prevent the gas company's monopoly, and there is no doubt if electric light could be supplied even at the same price as gas it would be very extensively adopted.

The King's Prize.—The Brussels *Moniteur* publishes a royal warrant on the King's prize, and gives the names of the jury for the 1889 competition. The prize for "mixed competition" is 25,000 francs or $5,000, and is to be given for the best work on the progress of electricity as a motor and a means of lighting, on the applications thereof and the economical advantages of its employment. Among the jury are the following: M. M. Montefiore Levi, Senator, President; Gerard, Professor Liége University; Kittles, Professor Darmstadt University; Cornu, Member Paris Academic des Sciences; Pontnière, Engineer, Professor Louvain University; Chevalier A. Roiti, Professor of Physics at Royal Institute of Higher Studies at Florence, and Sir William Thomson, Professor Glasgow University. The secretary is M. Gerard.

Blaming the Electric Light.—An accident which was attributed, I have no doubt under the idea that any excuse, even a bad one, is better than none at all, to the flashing of the electric light occurred last week to H. M. S. "Warspite," which came into collision in entering the Sound with a Swedish barque. The "Warspite" escaped without much damage, but had to tow the other vessel into harbor at Plymouth.

Electric Torpedo Boat.—I heard that the new electric torpedo boat, the joint invention of Mr. Edison and M. Goubert, which is now being experimented with by French naval officers, has several very decided advantages

over the types now in use. The boat is extremely light, and controllable from the shore; the torpedo is attached to the hull outside, but is readily set loose, and a pair of large curved shears are fixed at the box to cut nets and the connecting wires of submarine mines.

Electric Company for Sale.—The Jensen Electric Bell and Signal Company, of London, is advertised to be sold as a going concern, with all patent rights, stock in trade and fittings, early in September, by Messrs. Wheatly, Kirk, Price & Goulty, of Queen Victoria street, E. C.

New Works.—Messrs. C. A. Parsons & Company, now carrying on business at Park Road, Gateshead-on-Tyne, are erecting extensive electrical machinery works at Heaton, Newcastle-on-Tyne, and will remove there in about two months, when they are expected to be completed.

Too Much Money.—As I told you in my last letter was expected, the Fowler-Waring Cable Company had their capital largely subscribed by the public, and have sent out letters of allotment and regret.

An Electric Light Concession.—The Johannesberg Electricity Supply Company (Limited) has now been registered with a capital of £250,000 in £1 shares. Its object is to take over a concession granted by the Government of the South African Republic to supply electric light to Johannesberg and its suburbs, and generally to carry on the business of an electric supply company. The first directors are: Sir Charles Metcalfe, Bart, Sir Douglas Fox, F. Henwood, A. P. Matheson and Colonel R. Thynne, C. B., who are to divide among them as remuneration £2,000. As there has been a surfeit of electrical companies lately, and the board is not a particularly strong one, I greatly doubt if this company will succeed in getting its capital subscribed. C. Ff.

London, Aug. 28, 1889.

OUR CHICAGO LETTER.

Large T.-H. Plant.—The Peninsular Electric Light and Power Company is erecting a station from which to light the three towns, Linden, Red Jacket and Calumet, Mich. These towns are about six miles distant from the station, and of course, as 2,600 incandescent lamps are to be installed, the alternate system is to be used. There are also to be 200 arc lamps. The wire to be used is Roebling's weatherproof, and the circuits have been figured for a ten per cent. loss. Mr. F. N. Bosson, of the Thomson-Houston Company, of Chicago, has been commissioned for the work of installation.

The steam plant consists of two Williams compound, tandem, cylinder engines, with fire box boilers. The precaution has been taken, to prevent possible accident, of making parts interchangeable, to as great an extent as possible. Mr. Bosson left Chicago for this extensive work on Thursday, carrying with him the best wishes of all for his success. When it is in proper shape we are all going up to see it.

Electric Cars.—At Decatur, Ill., on the 27th, the first car was run by electricity on the Citizens' Electric Street Railway. The trip was over the north extension of the road and was an experimental one, but everything worked well, and a speed of eight to 10 miles per hour was readily attained.

Big Deal.—At Des Moines, Iowa, all the street car lines have been brought under one control. The electric railway sold for $350,000. The narrow gauge horse car line reverts to its former owner, and the East steam motor also goes into the trust. The value of the consolidated property is estimated at $750,000, and the chief members of the syndicate are T. J. Polk, Dr. Turner, T. E. Brown and C. H. Gatch, all of Des Moines. Electricity will now be placed on nearly every foot of the entire system.

To Wind 'Em Up.—The Central Electric Company has just brought out a pole wind-lass for attatchment to posts or buildings where arc lights are to be raised and lowered. The direct strain required to pull up a heavy lamp is considerable and fatiguing, while an uncertain grip on the line may not only drop a lamp but burn a hand as well. With a handle and the ratchet wheel and dog combination shown by the Central Electric Company, all this trouble and danger is done away with. The same company shows a very cheap and perfect shade holder for incandescent lamp purposes.

The Central Electric Company is sole agent for the improved Bain lightning arrester, described in another part of the Review. This form of arrester or protector is an improvement on a former design of Mr. Bain for the same purpose.

Of Course, Yes.—The special train *en route* from New York to the Minneapolis Telephone Convention will rest at Chicago on the 9th from 9 A. M. until 5.30 P. M.

Invitations have been issued to the delegates, who are to be in Chicago that day, to partake of an informal lunch at Kinsley's as guests of the Chicago and Central Union Telephone Companies here. The company—hosts and guests—will meet at the Electric Club rooms at 12 o'clock, noon. After luncheon a drive through picturesque Chicago will serve to make the boys somewhat familiar with the city, so that at the World's Fair they will not be total strangers to the geography hereabouts.

Electrical Travelers.—At the Club are registered during the past week D. L. Davis, Salem, O.; H. M. Dunn, Baltimore, Md.; W. S. Berry and F. H. Mason, city; C. A. Daigh, St. Paul; H. E. Chubbuck, E. T. Thomas, Theo. Traup, Springfield, O.; U. D. Lundy, city; H. E. Webb, Pittsburgh; John S. Whalen, Rochester, N. Y.

Of that World's Fair.—Priority of invention is the property of Chicago. She has it in the records. Mr. John P. Reynolds, secretary of the Chicago Inter-State Industrial Exposition Company, said the other day: "In connection with the movement to secure the location of the World's Fair of 1892, in Chicago, I find the following item of present interest in the record of proceedings of the stockholders of this organization at their annual meeting, November 14, 1885: 'Mr. Edwin Lee Brown offered the following resolution, which was adopted: *Resolved*, That it is the sense of this meeting that a great World's Fair be held in Chicago in 1892, the 400th anniversary of the landing of Columbus in America.'" Over four years ago! and it is further on record that a score or more of Chicago people met with Judge Shepard at his request to discuss this same matter, over three years ago.

A New One.—The Metropolitan Electric Light and Motor Company at Chicago, was recently incorporated to manufacture and sell electrical apparatus under certain patents. Samuel W. Adams, Chas. S. Raddin and W. Whitman are the incorporators, and the capital stock is $500,000.

Annual Chestnut.—The Inter-State Industrial Exposition opened as fresh as ever on the 4th instant. This year the Sperry Electric Company does the lighting. There will probably be no other electricity except that which comes in a bottle and cures catarrh, and the snapping kind that is produced by the grind stone process.

Every amusement house of any note in Chicago is now lighted by electricity, and there are many of them. The king plant, however, will be that at the auditorium. The capacity there is ten thousand 16-candle lamps, and there is every prospect of an excess of light beyond this being required.

Chicago, Sept. 7, '89. C. C. H.

OUR BOSTON LETTER

The Wright Electrical Engineering Company, of this city, are putting up a light plant at Nantucket, Mass., the well-known island watering place. The incandescent light, current for which is supplied from a 500-light Thomson-Houston dynamo, is being introduced into four of the large hotels and quite a number of business houses. An 18 light Thomson-Houston arc machine will furnish illumination for the streets of the island city. It is expected that current will be turned on during this week.

Gas and Electric Lighting.—The dealers in gas and electric light fixtures and fittings have recently formed an association in this city. The members say that "the introduction of electricity as an illuminator, and the great detail and vigilance necessary to satisfy all classes of trade, has demonstrated the advisability of rules to govern all alike." With this end in view, the following officers have been chosen: William Hollings, president; C. H. McKenney, N. W. T. Knott, William P. Shreve, J. C. Hollings and Warren Kinney, executive committee; E. S. Batchelder, secretary and treasurer.

Wiring the New Car Lines.—The electric roads in this city are to be built, and the cars put in use as rapidly as possible. The rebuilding of the tracks begins this week. Starting at the corner of Boylston street, new steel rails, heavier than those now in use, will be laid on Tremont street and Shawmut avenue. The electrical connections will be put in at the same time. The Thomson-Houston Company are already putting up the pole line on Warren street, Roxbury, and are working toward the city. Motor trucks are also being fitted up and the railroad company will use the car bodies which it now has. No date has been assigned as to when the lines will be in operation, but it is the intention of the officials in charge to push the work right along, so that the public may be accommodated just as soon as possible. The Park Square and Cambridge line is completed, with the exception of trolley wiring Charles street, but this, it is stated, can be done in 24 hours.

Notes from New England.—At Beasie, Me., near Bangor, is being built an electric light station to be run by water power. It is to be completed by Oct. 10, and will furnish current, T.-H. alternating system, for Bangor. A 500 h. p. engine will be installed for emergencies.—Fairfield, Me., using the Brush system, has more incandescent electric lamps in use in proportion to its size than any other town in the county. The advance was made from oil to electricity without the intermediate step, of gas, being taken.—The Shawmut Fibre Company, of Shawmut, Me., has just bought an incandescent Brush plant.

Personals.—Mr. S. M. Hamill, of the Brush Company, was a welcome visitor at this office early in the week. He was accompanied by Mr. L. H. Rogers, special agent of the Brush Company, who is now located at 113 Devonshire St., and ready for business.—Mr. S. C. Peck, of the Thomson-Houston International Company, started last week for his vacation in far northern Maine. A most pleasant vacation is what he deserves.—Mr. T. C. Perkins, of Hartford, payed this office a visit on Thursday, on his way home from a few weeks on the Maine coast.

Boston, Sept. 9, 1889. T. W. S.

PERSONAL.

Mr. E. T. Gilliland and party of European travellers are expected to return to New York this week.

On account of severe illness, Mr. P. C. Ackerman, agent of the American Electrical Works, in this city, was unable to accompany the delegates to the Telephone Convention.

Mr. Harry C. Haskins, formerly of Milwaukee, and who numbers a host of friends in telephone circles, is to be married at Elberon, N. J., Thursday, September 19. Miss Mary C. Runyon will at that time become Mrs. Haskins.

Mr. Carl T. Keller, son of Col. J. N. Keller, of Boston, has just entered Harvard College, having successfully passed the preliminary work a year in advance. The young man evidently possess a good deal of the energy of his father.

Mr. Chas. H. Cone, who for five years past has been actively identified with the Electrical Supply Company in the West, has made a change of base and will hereafter be connected with that progressive Chicago establishment, the Knapp Electrical Works.

Mr. H. L. Storke is again in New York, having recovered from a very severe and prolonged sickness. His numerous friends in this city gave him a most cordial welcome. Mr. Storke and Mr. A. B. Uline will attend the Minneapolis Convention, joining the special train at Chicago.

We were favored with a call from the following noted Southern physicians who were looking up electrical matters in New York this week: Among the party was Dr. J. Y. Crawford, Dr. Geo. Winkler and Dr. Gordon White, of Nashville, Tenn.; Dr. Geo. Enbank, of Birmingham, Ala., and Dr. J. Rollo Knapp, of New Orleans, La.

Mr. W. D. Sargent, the representative of the telephone interests of the United States at the Paris Exposition, will present a paper at the Telephone Convention, giving some of his "Observations" while abroad. Mr. Sargent is of an observing turn of mind and the members of the Association may expect to hear many things of attractive interest.

We understand that the American Welding Company, of Lynn, whose stock is now quoted at $325 bid, will soon double its stock to $1,000,000, giving its shareholders a right to subscribe for a share for each now held at $100 each. This will make a right worth about $112½. The Welding Company is increasing its output and needs more working capital. It is earning a very large profit.

H. S. Connor, who has been for a number of years one of the principal experts of the Brush Electric Company, has taken charge of C. C. Curtiss' business during Mr. Curtiss' absence in Europe for the past three months. Mr. Connor sold to the Mississippi Mills, at Wesson, Miss., what is believed to be the largest electric light plant installed in any of the Southern mills. The plant is now being erected by the Brush Electric Company and consists of 845 light-arc dynamos, with a total capacity of 360 arc lights, in addition to 150 incandescent lights. In addition to this plant, Mr. Connor has sold the following arc and incandescent plants: Woolen Mills, Louisville, Ky.; Louisville Bagging Company, Louisville, Ky.; New Albany Woolen Mills, Louisville, Ky. Mr. Connor is a nephew of N. S. Possons, the superintendent of the Brush Electric Company, and if the first plant sold by him to the Mississippi Mills is any criterion of his ability, he will prove a valuable agent to the Brush Company.

THE TELEPHONISTS OF THE EAST SET THEIR FACES WESTWARD.

(*Continued from page 1.*)

Doolittle, Thomas B., special agent, American Bell Telephone Co., Boston, Mass.

Eastabrook, William N., general manager, New York and Pennsylvania Telephone Co.; Eastabrook, Mrs. Wm. N., Elmira, N. Y.

Eckert, William H., general manager, Metropolitan Telegraph and Telephone Co., New York, N. Y.

Egleston, Melville, secretary, American Telegraph and Telephone Co.; president (Domestic, Newark, N. J.) Telegraph and Telephone Co.; Egleston, Mrs. Melville, New York, N. Y.

Farnham, I. H., electrician, N. E. Telegraph and Telephone Co., Boston, Mass.

Glidden, Charles J., treasurer, Erie Telephone Co.; Glidden, Mrs. Charles J., Lowell, Mass.

Hall, Edward J., Jr., general manager, American Telegraph and Telephone Co.; Hall, Mrs. Edward J., Jr., New York, N. Y.

Hall, George G., special agent, American Bell Telephone Co., Boston, Mass.

Ivers, Samuel, treasurer, So. Mass. Telephone Co.; Ivers, Miss Ella F., New Bedford, Mass.

Johnson, Charles F., official stenographer, New York, N. Y.

Keller, Jasper N., general manager, N. E. Telegraph and Telephone Co., Boston, Mass.

Lockwood, Thomas D., electrician, American Bell Telephone Co., Boston, Mass.

Manson, George T., Okonite Co., New York, N. Y,

McQuaide, James P., secretary, National Conduit Manufacturing Co.; McQuaide, Miss F. Quandaro, New York, N. Y.

Metzger, Henry, general manager, Central District and Printing Telegraph Co.; president, National Telephone Co., Pittsburgh, Pa.

Morgan, A. O., special agent, American Bell Telephone Co.; Morgan, Mrs. A. O., Boston, Mass.

Pickering, J. W. C., director, Erie Telephone Co.; Pickering, Mrs. J. W. C., Lowell, Mass.

Pitcher, H. H., with Law Telegraph Co., Brooklyn, N. Y.

Plush, Dr. S. M., general manager, Bell Telephone Co., of Philadelphia, Pa., Philadelphia, Pa.

Price, Charles W., Electrical Review, New York, N. Y.

Sargent, William D., general manager, New York and New Jersey Telephone Co.; vice-president, National Telephone Exchange Association, Brooklyn, N. Y.

Sprague, Levi, director, Erie Telephone Co.; Sprague, Mrs. Levi, Lowell, Mass.

Stump, Clarence E., business manager, *Electrical World*. Frank Mason, Brooklyn.

Stanley, Henry D., Bridgeport Brass Co., Bridgeport, Conn.

Taltavall, J. B., editor, *Electric Age*, New York, N. Y.

Thayer, Henry B., manager, Western Electric Co., New York, N. Y.

Tyler, Morris F., president, Southern New England Telephone Co., New Haven, Conn.

Walner, G., superintendent, Government Telegraph, Berlin, Germany.

Westbrook, W. T., general manager, Delaware and Atlantic Telegraph and Telephone Co., Philadelphia, Pa.

Weston, Governor, J. A., director, Erie Telephone Co.; Weston, Miss Grace H., Manchester, N. H.

THE CONVENTION PROGRAMME.

Secretary Barney told me to-day that the programme at the Convention would consist of the following papers, and perhaps others:

"A New Era in Telephoning," by A. S. Hibbard, F. J. Carty, F. A. Pickernell, all of New York.

"Switchboards and Long Distance Lines on Grounded Circuits," by Fiemon Drake, of Omaha.

"Telephone Salutations," by R. M. Bailey, of Williamsport, Pa.

"Underground Wires," by J. C. Reilly, of Brooklyn.

"Observations," by W. D. Sargent, recently of Paris.

"Switchboards," by Geo. J. Davidson, of Brooklyn.

Telephone News

⁂ The Telephone Company at Salt Lake City have ordered 56 miles of No. 10 copper wire for the new Ogden-Salt Lake metallic circuit on which work begins in 10 days. The Telephone Company are enterprising and mean to keep in advance of the times. When the new wire is up talking between the two cities will be easy enough.

⁂ Mr. John Lawrence, of the Sunset Telephone and Telegraph Company, is making his arrangements to put in a telephone plant at North Yakima, W. T. He has met with the universal support of the citizens in the project, and has completed his survey. The poles have been ordered and the system will be in operation in a very short time.

⁂ T. C. Frenyear, agent for the Brush Electric Company, of Cleveland, O., is in Utica, N. Y., in the interests of the Short Electric Railway Company, which is controlled by the Brush Company. He is obtaining facts about the street railroad in order to enable the company he represents to make estimates for introducing its system there in case it desires so to do.

⁂ Work on the line of the New Brunswick Telephone Company between St. Johns, N. B., and Fredericton is being pushed rapidly forward, and it is hoped that in about two weeks the wires will all be stretched and the completed line will be ready for use. Last week the instruments were put in the office at Hampstead, and connection made with Oak Point. The company are stretching two wires, one for local work and the other a through wire.

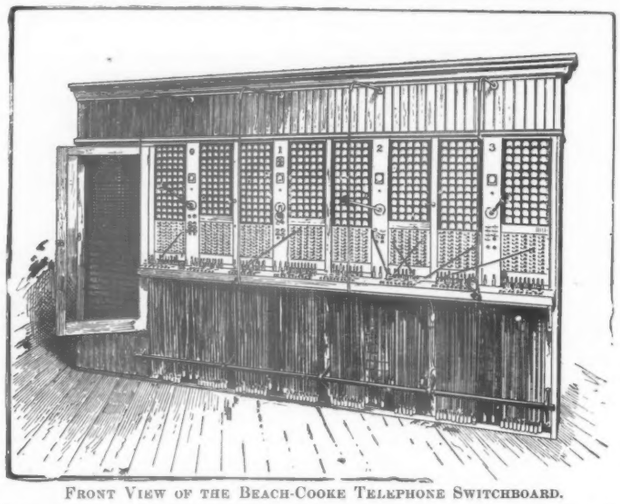
⁂ The New England Telephone Company has a construction gang of 20 men under Supt. J. A. McCoy, of Boston, and Dist. Supt. M. Hutchins, of Springfield, at work rebuilding 93 miles of telephone lines between Fitchburg and North Adams. All the old poles are being removed, and new ones of a much larger size are being put in their places. Electric light wires that have been on telephone poles will have to be removed, as the line will be independent of all other wires. Most of the old wires will be removed Long distance telephone stations will be established at Orange and all large towns between North Adams and Fitchburg The cost of rebuilding this line will be $18,000.

⁂ It is stated that Quong Wah Lee is a "Christian Celestial," not a "heathen Chinee." Quong, like most of his countrymen hereabouts, runs a laundry, but although he labors early and late he has not failed to notice the Melican man's strange and mysterious devices, and they have excited his wonder. The telephone is a thing of great interest to him, and last Sunday he took a brother Celestial into a store, and pointed out the mysterious contrivance which both stood and regarded with silent awe. The gentleman in the store seeing the interest they took in it, asked Quong if he would not like to talk to it, which was exactly what he did want. The "Central" was accordingly rung up and Quong put in position to try the effect of his soft tones and peculiar English on the pretty telephone girl. Now telephone girls will, once in a while, flirt just a little, if business is dull, and there was not much going on Sunday. Whether there was anything of that sort in this instance, of course we do not know, still a Celestial flirtation would be something out of the common order, and might be a relief after a week of young dudes and old grass widowers whose wives are away in the country. At all events, Quong was greatly tickled and as delighted as a child, and left the store with a profound faith that Melican man could do anything, and that telephone girlee was velly nicee.

Telephone Switchboard Improvements.

THE BEACH-COOKE TRANSFER SYSTEM AS ADOPTED BY THE CENTRAL UNION TELEPHONE COMPANY.

This company, operating nearly all exchanges in the States of Ohio, Indiana, Illinois and Iowa, has recently adopted improvements worthy of attention in connection with the switchboards of its medium-sized exchanges. In all such exchanges the company uses the Standard Western Electric



FRONT VIEW OF THE BEACH-COOKE TELEPHONE SWITCHBOARD.

switchboard, grouped in sections for 50 wires each. Many worn out boards are being renewed and central offices removed to permanent quarters, etc., and the company has abandoned the customary plan in such cases of forwarding boards in separate sections to be set up and wired at the destination, instead of which, the several sections of a proposed board are assembled at the company's repair shop in Chicago, where they are encased, equipped with cross connecting boards and wired complete before shipment. The advantages gained by this plan are a substantial and uniform method of wiring, and a saving of much expense heretofore unavoidable in transferring from place to place for that purpose men expert in such wrok. We have shown on this page a cut of a switchboard of eight sections with a capacity for 400 wires, which has been completed for the Youngstown, Ohio, exchange. An important feature of this board is an improved transfer system, by means of which calls received for connection with subscribers whose spring jacks are located beyond the reach of the answering operator are instantly thrown to the second operator, who is, at the same time, automatically signalled, the connection being completed without delay, extra motions or the necessity for conversation between operators and consequent confusion.

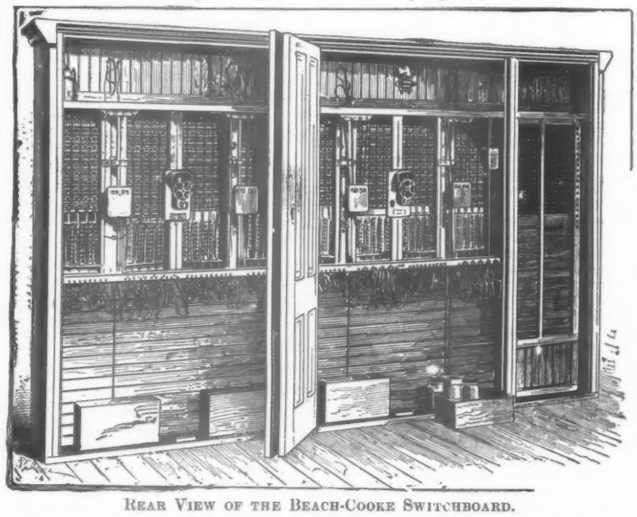
This transfer system is the invention of Messrs. Beach & Cooke, of the Central Union Company; is thoroughly practical, without complication, and is already in successful operation at several of the company's exchanges, the number of subscribers in each ranging from 500 to 800.

The Toledo, Ohio, exchange, with over 1,000 subscribers, is to be equipped with this style of board and transfer, provision being made for ample growth.

As many inquiries are being received regarding this transfer system, the Central Union Company will exhibit the Youngstown board at Minneapolis during the Telephone Convention, and it will no doubt attract attention, especially from those who are operating medium-sized exchanges and desire to avoid or defer the expense of multiple boards.

⁂ There comes a report that Drawbaugh has made arrangements to bring another suit against the Bell Telephone Company. Thereupon Bell stock goes up several points!

⁂ The new line of telephone poles between East Putney and Brattleboro, Vt., is completed, preparatory to putting on the long distance line between Bellows Falls, Vt., and Springfield, Mass.



REAR VIEW OF THE BEACH-COOKE SWITCHBOARD.

⁂ A special meeting of the stockholders of the American Bell Telephone Company was held at the Meionaon, No. 88 Tremont street, Boston, Mass., on Thursday, September 12, 1889, at 11 o'clock in the forenoon, for the following purposes: 1. To accept the act authorizing the American Bell Telephone Company to increase its capital stock, being chapter 385 of the Acts of 1889 of the Commonwealth of Massachusetts; and 2. To consider and act upon the question of increasing the capital stock of said company and the number of shares therein. The transfer books of the company will be closed from the 9th to the 12th of September, 1889, both days included.

The Proposed Postal Telegraph System.

It has been reported for some time past that a scheme was being worked out to unite our post office service with the telegraph service of the Western Union. The main features of the arrangement were stated to be that the letter carriers, by such arrangement, would deliver messages at a reduced rate. In consideration of this privilege the collection and delivery of the messages were to devolve upon the Post Office Department, thus perfecting a saving to the company a heavy expense in the matter of terminal charges. The arrangement was considered a mutually beneficial one, both as regarded the company and the Government.

Dr. Green, the president of the Western Union Telegraph Company, consented to give an interview to the *Mail and Express*. He was seated at his office in the Western Union Building when the reporter called:

"Doctor, during your visit to Washington, dispatches were received here stating that as a result of your visit on the Postmaster-General you were in exceedingly good humor. Was this the result of the settlement of the differences existing between your company and the Post Office Department?"

"Well," replied the president, "I do not see that there is anything very remarkable in my being in good humor, exceedingly or otherwise. I only saw one reporter in Washington, and he certainly had no particular cause to make such a statement. He followed me to the hotel one evening and asked me about the matter in dispute, to which I replied that there was nothing of importance to communicate."

"Have you completed any arrangements with the Postmaster-General looking to the establishment of a postal telegraph system?"

"No; although I will not deny that it was in regard to such a proposition that I went to Washington. The fact of the matter is that Secretary Wanamaker has an idea that he can utilize his free delivery system to advantage in handling and delivering messages. I do not think that such a thing is possible, as I am not aware that it is his intention of employing a separate force to transact the telegraph portion of the business."

"It was stated that you went to Washington to complete the details of a plan arranged between Mr. Gould and the Postmaster-General at the Saratoga conference."

"Nothing of the kind. Postmaster Wanamaker had an idea that he could handle a vast amount of telegraphic matter by the post office officials. He had an idea that it could be done, and on a visit which he paid to Mr. Gould, at Saratoga, he suggested the plan to him. Mr. Gould said that the plan was worth considering. That was all that passed between them at Saratoga."

"Did you not also have a consultation with the Postmaster-General at Saratoga?"

"Yes; I went up there and had some talk with Secretary Wanamaker. He said he did not know a great deal about the matter; still, he thought there was a good field there that might be utilized and improved. He had 59,000 post offices, while we had not more than 19,000 telegraph stations, so that there were 40,000 more post offices than telegraph offices. I suggested that perhaps there were not more than 1,000 in the whole 40,000 post offices where there was no telegraphic connection that would pay the salary of a telegraph operator, but he thought that might be overcome by appointing telegraph operators as postmasters."

"Well, would not that solve the difficulty?"

"Hardly. Everyone knows that there are a large number of post offices where the postmaster receives a commission on his sales of stamps. It is my belief that his commission as postmaster and the revenue which he would derive as operator together would not be enough for him to live on, and he would be compelled to do something else besides. It is a well-known fact that many people take those positions who desire nothing, or next to nothing, for their trouble. They are storekeepers who think, and perhaps rightly, that people coming to their places of business for their letters might be induced to make purchases there as well."

"And so no definite settlement was reached between yourself and the Postmaster-General?"

"No, positively none. There were no negotiations contemplated or understood, because there had been no Act of Congress passed authorizing the Postmaster-General to make any. There was an idea that some such plan might be submitted to Congress, and the Postmaster-General simply put himself in communication with the telegraph companies in order to obtain information on

the subject. I believe he has talked with other telegraph men besides myself."

When asked to give an authoritative statement of the plan proposed by the Postmaster-General, Dr. Green said that it was the intention of Mr. Wanamaker to connect all the post offices in the country by telegraph and receive and deliver messages just the same as a telegraph company. The idea was to obtain these wires from the telegraph company and to pay the company a percentage of the receipts from the business handled. The Western Union would continue to do business at the old stand, and one of the advantages to them, if the arrangement is completed, will be the saving of terminal expenses.

The post office telegraph department would, of course, endeavor to do the business at a lower rate than that which is now charged, but he had no fear of this competition, and, in fact, seemed to ignore entirely the idea that the government could successfully cope with his company in the telegraph field. Dr. Green did not think they would get any business except in places where the Western Union had no office, and very little there.

The service, he thought, would be second class. It could not be otherwise, and there was no business man, either banker, broker, or anything else who was going to use that sort of a line, because time was worth a great deal more to them than money.

Direct Cable from Hong-Kong to Singapore.

As it is suggested that this cable should land on the territory of the British North Borneo Company, touching also at Labuan and Sarawak before reaching Singapore, it hardly merits the name of a "direct" cable, says our London namesake. The manager in China of the Eastern Extension, Australasia and China Telegraph Company, when writing to the Colonial Secretary at Hong-Kong on the subject of the above cable, says, that "the existing cables are amply sufficient to carry a considerable increase of the present traffic," and goes on to point out, that, as "the additional traffic due to the establishment of the proposed new cable would be entirely insignificant in proportion to the large outlay, my directors instruct me to state that the extension could only be carried out in consideration of the undertaking being subsidized by the governments interested." Now, as the cost of these cables would be considerably over £400,000, it is not difficult to imagine the amount of the subsidy demanded to pay interest, working expenses, and sinking fund, on a cable whose value for commercial purposes would be infinitesimal in time of peace, and whose utility in war-time would be simply nil. To pay £30,000 or £40,000 per annum for such an unnecessary luxury as these cables strikes us as absurd in the extreme. The main advantage claimed for such a route is its political utility; but as for considerably over 1,000 miles of its length this cable would lie in water under 100 fathoms deep, it is obvious that in war-time an enemy could easily reap the advantage of what may be called an exclusively British manufacture, by picking up as much of this shallow-water cable as he might require and lay it in some other place where it would be more useful to him. Such a cable, from a political point of view, can only be looked on as reserve stock on which an enemy may draw as his needs dictate. It would be much wiser, and much more economical, to keep such a cable in a tank *in England;* the traffic might not be so great, but there would be the negative advantage that in war-time the cable could not be used against us by our adversaries.

Two weeks ago the cable connection with New Zealand was interrupted; thus we find that one of our great colonies is again cut off from communication with England. This cable was laid in 1876 at a cost, officially stated to be, of about £300,000, and 11 years later was offered for sale for £150,000; but this offer, however, was not accepted, as it was found that a new cable could be obtained for less than £150,000. As New Zealand is one of the colonies which is willing to assist in the establishment of the proposed cable across the Pacific, it did not require this interruption to indicate the necessity of duplicating telegraphic communication with Europe by a route more secure than that along which the present lines are laid.

Electricity at Cleveland.

Cleveland now claims to be the electric city of the West. In a short time there will be over 100 electric street cars running over the principal streets of Cleveland, besides a large number of stationary electric motors in use in a great many and varied industries throughout the city.

The history of the East Cleveland Street Railway Company, which was the first in Cleveland to adopt electricity on its line is an instance of the success and satisfaction which electric street railway cars are giving in every city where they have been installed. The first equipment of the East Cleveland Street Railway Company was installed by the Sprague Company about nine months ago, and included overhead line, station equipment and 16 electric motor cars.

The electric line was to cover some of the most important and principal business and residential streets in Cleveland, but the equipment was finally installed, and after it had been put in operation, the citizens of Cleveland discovered that the neat iron poles and overhead erection were hardly noticable, while the rapid transit afforded by the street cars was something vastly superior to the former slow service given, when the cars were drawn by animal power.

There have altogether been five separate orders given by the East Cleveland Company for electric car apparatus. The second order was for four additional cars; the third for eight additional cars; the fourth for eighteen additional cars, and a recent order placed with the Sprague Company by its agent, Mr. C. W. Foote, for 30 additional motors, making 76 motor cars to be operated on this one line.

Besides this road, there are two others; the Broadway and Newburgh, and the Brooklyn avenue road, which are also operated by electricity in Cleveland. There is nothing which speaks more highly for any kind of apparatus than the endorsement by its users, and there is no endorsement more convincing than the continued addition to an original equipment. The results, therefore, at Cleveland prove conclusively the good results and satisfaction given by electric apparatus when applied to street railways.

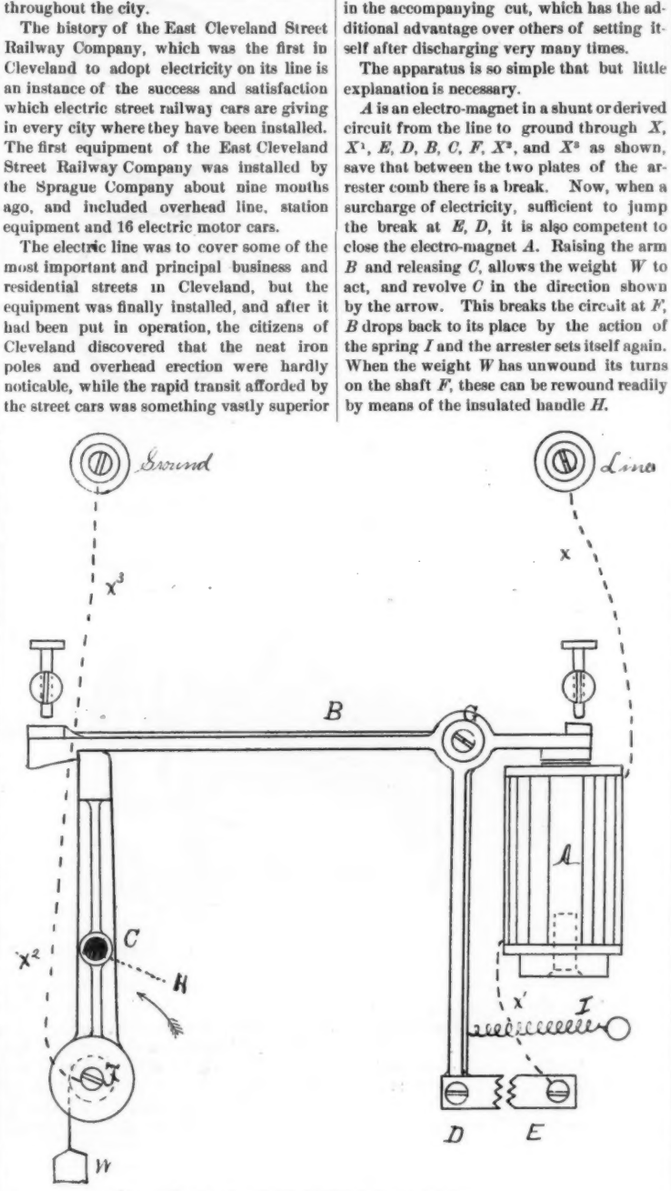
The electric census machine is at work in Washington. Some surprises in comparisons are sure to be developed.

Bain's Improved Lightning Arrester.

The electric light man is not infrequently annoyed where the plant is an extensive one, by the occasional visit of a discharge from the store house of nature. To remedy this, no inconsiderable ingenuity has been expended. One of the last of these is shown in the accompanying cut, which has the additional advantage over others of setting itself after discharging very many times.

The apparatus is so simple that but little explanation is necessary.

A is an electro-magnet in a shunt or derived circuit from the line to ground through *X*, X^1, *E*, *D*, *B*, *C*, *F*, X^2, and X^3 as shown, save that between the two plates of the arrester comb there is a break. Now, when a surcharge of electricity, sufficient to jump the break at *E*, *D*, it is also competent to close the electro-magnet *A*. Raising the arm *B* and releasing *C*, allows the weight *W* to act, and revolve *C* in the direction shown by the arrow. This breaks the circuit at *F*, *B* drops back to its place by the action of the spring *I* and the arrester sets itself again. When the weight *W* has unwound its turns on the shaft *F*, these can be rewound readily by means of the insulated handle *H*.



Bain's Improved Lightning Arrester.

Electrical Apparatus Abroad.

Information has reached us that the Sprague Electric Railway and Motor Company has recently closed quite a large contract for electric street railway apparatus with the principal street railway company of Florence, Italy, for the equipment of their line. This apparatus includes overhead system of the regular Sprague type, 10 complete car equipments using two 15 horse-power motors on each car, and station equipment complete.

This will be one of the first installations of American street railway apparatus abroad, where the progress in electric railway science has been very slow. The present method of running street cars in Florence is partly by animal power, and partly by small steel dummies, and it is thought that the electric cars, which combine the safety of the horse car with the speed of the steam car, and are much cheaper to operate than either, will have a large field to fill. It is said that this equipment is only a small portion of a very large equipment which will be ordered by this company, and if the result proves successful it is thought that very many other Italian cities will adopt electricity for their street cars.

TELEGRAPHIC

.... The Commercial Cable Company, on the 30th ult., filed with the Secretary of State a certificate of increase of capital from $6,000,000 to $10,000,000.

.... Extensive improvements are being made in the Pittsburgh, Pa., office of the Postal Telegraph Company. Three eight-horse power dynamos are being substituted for the old batteries. The company at present employs 40 operators in this city. New tables and desks are being put in its office, and there is a general overhauling and renovation going on.

.... A great many people seem to be laboring under the impression that a trip in the electric cars during a storm accompanied by lightning is exceedingly dangerous. Such, however, is not the case, for so excellent are the precautions taken to insure that the discharge is conducted to the ground that no harm can result. Each car is provided with lightning arresters, which protect the apparatus from all damage, and absolutely insure the safety of the passengers.

.... Mr. M. S. Harris, so well and favorably known as the former manager of the Southern Telegraph office in Charleston, S. C., is in Columbia for the purpose of fitting up and opening the new office of the Postal Telegraph Company. Mr. Harris, when the office is opened, will probably remain in charge of it until a regular manager is appointed. The Postal lines are by far the best which have been built in this city. The office will be on Main street, directly opposite the *News* and *Courier* Bureau.

.... Dr. J. Emmet O'Brien contributes a paper to the September *Century* entitled "Telegraphing in Battle," from which this incident is quoted: "On one occasion an operator started out from Fairfax station on a hand-car propelled by three contrabands to attempt to restore the line so that Pope's operators could communicate his whereabouts. Finding the line cut beyond Pohick Bridge, he spliced it and got signals from both directions. While so engaged a party of guerrillas emerged from the woods to the track and surrounded him. Bidding the negroes stand fast, he dictated a swift message over the line, which was being repeated back to him and copied as the Confederate leader leaned over his shoulder and read the significant words: 'Buford has sent back a regiment of cavalry to meet the one from here and guard the line. If you are molested we will hang every citizen on the route.' The instrument ceased ticking as the operated firmly replied, '. .—. .—' (O. K.). A painful pause ensued. The Confederate might have suspected a ruse if at the moment a gleam of sabers had not shown in the direction of Fairfax Court House. Hastily starting for the woods, the leader exclaimed, 'Come home, boys; these yere ain't our niggers;' and they disappeared, while the hand-car, as if driven by 40 contraband power, sped rapidly rearward. Pope's wires were not well guarded at any time."

Articles from Active Brains.

The *Home Monthly* remarks that "the ELECTRICAL REVIEW is published at 13 Park Row, New York, price, $3.00 a year. It comes weekly, filled with articles from active brains and pens wielded by those who are foremost in scientific matters. Fine paper and illustrations."

"Easily Leads."

The ELECTRICAL REVIEW has taken and easily keeps the lead among the publications of America devoted to electrical matters.—*Portland Transcript.*

* * In England elevators are now often run by electricity. In 1890 Edinburgh will hold an exhibition of electrical appliances.

* * The Hartford Dynamic Company has received permission to operate an electric storage battery car for purposes of trial and experiment on the tracks of the street railroads of New Haven, Conn.

* * All the street car lines in Des Moines, Ia., have passed into one control. The consolidated property is valued at $750,000. It is expected that electricity will be introduced on nearly all the lines.

* * The city council, of Dubuque, Iowa, recently granted the Electric Motor Co. an extension until January 1 for the completion of the road, and eliminated that clause of the charter requiring the use of the Johnstown rail. The company may use any rail which meets the approval of the council.

* * The three engines and boilers at the new electric light station at Springfield, Mass., are now in daily use, and the works have been running 24 hours a day for over a week. A new power motor, with a capacity of 150 horse-power, has just been put in, and will be ready for work as soon as the new motors are received.

* * Work on the South Broadway, Denver, Col., electric road is progressing very satisfactorily. The power house is to be erected at the middle point of the line, where the Santa Fe track crosses. The building is to cost $20,000, and with mechanism $20,000. The company expects to be carrying passengers early in October.

* * E. P. Shaw has bought a controlling interest in the Dover, N. H., Street Railway and will make great improvements and alterations. The charter of the road will be amended and a bill for that purpose is now pending before the legislature. It will allow rail connections with Great Falls and electricity to supersede horses as motive power. It is reported that $200,000 will be put into extension and improvements, and the Thomson-Houston electrical system for motive power will be used.

* * The report of the expenses of the Wyatt Park Railway (Sprague system), of St. Joseph, Mo., is given as follows: Six cars have been run on three miles of double track from Jan. 3, 1889, to July 1st. The maximum grade is 8½ per cent. Total expenses for this period, exclusive of salaries, $3,067.73. This covered feed for team, hauling fuel, fuel, car repairs, brushes, oil and lubricants, supplies, freight, waste, overhead repairs, motor repairs, engine and boiler repairs, light account. If owners of street railway lines, now operated by horses, will investigate the electric railroads in operation, they will see that they are simply throwing away money by using horses.

* * The introduction to this city of electric cars on the Fourth avenue line has been so thoroughly successful that the number is being increased daily, with 10 in constant service at this time running between Eighty-sixth street and the post office, with intervals of from eight to 12 minutes. They represent all the advanced ideas in the use of electricity for traction purposes, and are easily handled. It is evident from the speed attained that if there were no horse cars to impede their progress there would be a great gain in time. This gain will, of course, be reached when the horses disappear, as they seem very likely to do, at the rate at which the new cars are now being put on. A large number of additional cars are now being hurried to completion at the shops of the John Stephenson Company, almost all of which are intended for the Fourth and Madison avenue line.

A Practical Method of Driving Dynamos Direct from the Engine Pulley.

The problem of driving a dynamo directly from the fly wheel of an engine is one that has long attracted the attention of inventors and scientists everywhere, but with no practical results until very recently. The system of belting, illustrated in the accompanying cuts, the invention of Mr. G. Frank Evans, and controlled by the Evans Friction Cone Company, of Boston, seems to be a practical method of accomplishing this result.

The system consists, simply, in running a loose belt between two pulleys. In the fact that the belt is loose and free to act under the influences of forces operating on it, lies the secret of the efficiency and power of the device. Among the advantages of the system are the great saving of space, saving of expensive belts and the facility with which any one of a number of dynamos operated by one engine may be started or stopped independently of the others, the simple turning of a hand-wheel accomplishing this. Not the least of these advantages is the saving of wear and tear and power, arising from the fact that more power is obtained with less pressure on the bearings than in ordinary belting practice.

In Fig. 1 is shown an engine driving four dynamos direct from the fly wheels. *A* represents the loose belt, which runs between the flange dynamo pulley *B*, and the fly wheel of the engine. Each dynamo is started or stopped by turning the hand wheel shown in the illustration. The hand wheel serves also to regulate the pressure on the belt. At the Chestnut Hill pumping station where the writer saw the system in practical operation, most satisfactory results are obtained. The speed is unusually steady, and no trouble whatever has been experienced from heating.

The diagram, Fig. 2, is a sectional view showing the loose belt running between two pulleys *C* and *D*, and turning in the direction shown by the arrow.

It makes no difference which is the driver, but for the purpose of explanation, let *C* be the driver. The friction of the pulley *C* on the belt will produce a tangential force to the right, and the friction due to the resistance of *D*, the driven pulley, will, of course, be practically an equal force acting in the opposite direction but on the under side of the belt. These two forces constitute a static couple, and since the belt is loose and free to move under the action of these forces, there will be a tendency to rotation of that portion of the belt between the pulleys. This will throw the right hand portion downward and the portion to the left upward. The center of pressure will thus be thrown to the left on the driving pulley and to the right on the driven. The pressure is therefore transmitted in an oblique direction, having a component in the direction of rotation and diminishing the pressure on the bearings. In watching the practical operation of one of these belts, this action is seen to take place.

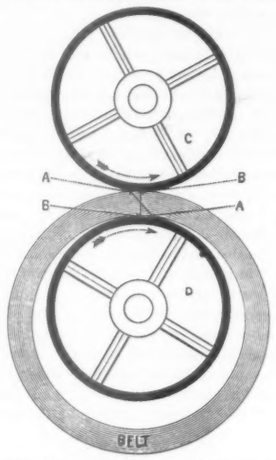


Fig. 2.—Diagram Showing Principle of the System.

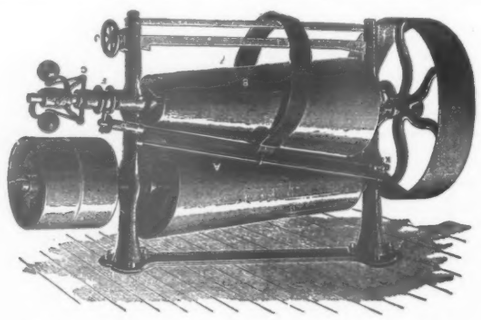


Fig. 4.—The Evans Friction Cone with Governor.

The tangential forces alluded to, since they act in opposite directions on opposite sides of the belt, produce, moreover, a falling action which creates a pressure in some degree proportional to the amount of power transmitted. This is known to be so from the fact that where large powers have been transmitted in this way, the belt is found to be comparatively loose, when the engine is stopped, although when driving, a force of several hundred pounds is required.

A machine, as shown in Fig. 3, was built for the purpose of comparing the transmitting power of this system of friction with the ordinary method of belting. In the diagram, pulley *B* is encircled by a loose friction belt. Pulley *A* runs in boxes which are loose and free to slide in the ways *H* to and from pulley *B*. *D* represents a center shaft which is driven from overhead. An open belt, *E*, is laced over pulleys *A* and *D*, and draws *A* against *B*. The pressure on the friction belt is thus due only to the pull of the belt *E*, and the pressure on the bearings *H* and *G* must necessarily be the same. By putting a brake on pulley *K*, pulley *B* holds pulley *A* dead still, although the loose friction belt has but half the width of the open belt *E*. This shows that with the same pressure on the bearings, at least twice as much power can be transmitted by a belt of a certain width, by this method of friction, as by a belt of the same width used in the ordinary way.

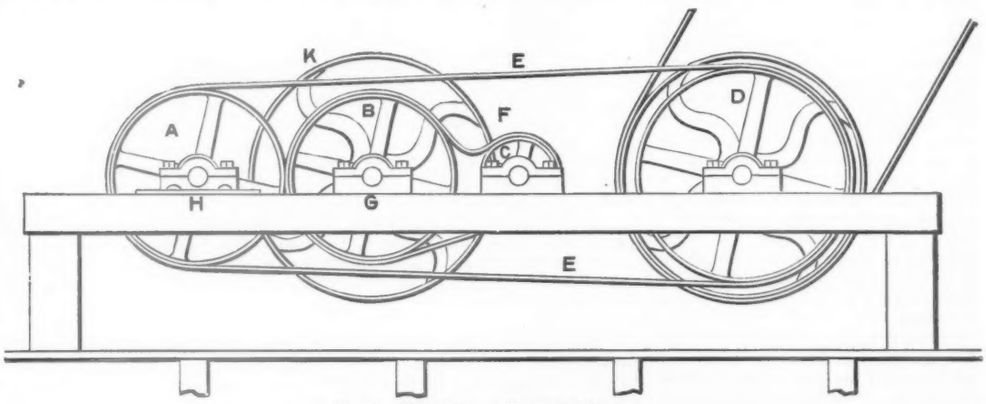


Fig. 3.—Diagram of Testing Machine.

Another application of this principle may be seen in Fig. 4. By this apparatus, the speed of a dynamo may be kept constant, independently of any variations in the speed of the prime mover. Power is transmitted from one cone to another by means of a loose belt. A governor is attached to the driven cone, and is so arranged that a change of speed in the driver will cause the friction belt to be shipped to a position which will maintain a constant speed of the driven cone. This gives close regulation.

Celebrated experts, among whom may be mentioned Mr. Henry R. Towne, president of the American Society of Mechanical Engineers, have given the system practical tests, and are unanimous in pronouncing for it a favorable verdict.

* * At a special meeting of the city council at Warrensburg, Mo., a franchise was granted the Electric Springs Company to construct and operate a street railway. The franchise is an exclusive one for a term of 30 years. The matter of granting this franchise was up before the council two weeks ago, but from the fact of a contemplated dummy from Pertle Springs, which would be prohibited an entrance into the city if the car line was constructed, the franchise was defeated. By the present terms, one of the main streets is left open to the dummy line. The car line is to be in operation within 90 days.

* * Regarding the probability of the West End Street Railway, of Boston, Mass., being able to save enough in its expenses to pay the 10 per cent. dividends on the new common stock which will be issued, President Whitney expresses the greatest confidence. In the first place, the lines where electricity is being used already are earning better than ever before; in July the Brighton line earned $9,139, or more than any month in its history. Then the electric lines are operated by the Thomson-Houston Company at an agreed rate per car mile, which reduces the principal item of operating expenses to a known sum. On the basis of the contracts, the saving to the West End in cost of motive power alone will be equal to 10 per cent., or more than twice $4,000,000.

* * The Indianapolis, Ind., Town Board, which granted the Citizens' Railway Company a 50 years' franchise, and afterward rescinded the ordinance, has provided for an electric railway. Last week it granted to the West Indianapolis Electric Railway Company the right to transport the citizens of that community for the next 20 years. The new ordinance gives the company, and its successors and assigns, authority to lay a single or double track street railroad, with all the necessary side-tracks, upon 28 of the principal streets in West Indianapolis.

Senator Ingalls Takes a Hand in an Electricity-Gas Company Fight.

Senator Ingalls, of Washington, D. C., who is chief of the Senate Committee on the affairs of the District of Columbia, last week took a hand in the fight between the Electric Power and Heat Company, of Pittsburgh, and the gas company, by informing the commissioners that they had best go slow in granting to a foreign company the privilege of tearing up the streets to lay wires. The Senator could not explain, however, in what way it was more injurious for a foreign company to do this than for a domestic company. The truth is, the gas company is principally composed of Philadelphians, and there is hardly a corporation doing business under a charter in Washington which is not as foreign in its composition as the Electric Heat and Power Company, which has several prominent gentlemen of Washington in its membership.

Before making the contract with the electric company the commissioners laid the whole matter before Attorney Riddle, counsel for the District, who decided that the commissioners could proceed as they have.

—— The Brush Company has just received orders for six No. 8 sixty light dynamos with arc lamps, etc., for use in extensions at San Francisco and San Jose, Cal., and Portland, Oregon.

Opening the London Campaign.

H. M. Byllesby, general manager of the Westinghouse Electrical Company, sailed on the "City of Paris" on Wednesday last for London. A corps of electrical experts accompanied him. The Westinghouse Electrical Company have recently decided to build a branch works in England, and Mr. Byllesby goes to superintend the construction and equipment of the works and to make arrangments for the introduction of the company's electrical appliances and lights in London and vicinity. The Westinghouse Electrical Company have been chartered as an English corporation, and will be independent of the American company of the same name. The capital is $3,000,000. The new plant will be situated on the York Road, adjoining the Westinghouse Air Brake Works, London.

—— St. Paul, Minn., is going into the electric street railroad business with a rush. The city council has passed ordinances giving to four different companies a franchise to put in electric lines. One of the franchises, it is interesting to note, was given to Archbishop Ireland, who, it may be, is to invest church funds in the enterprise. The Thomson-Houston Company received one of the four franchises granted, covering all the city with the exception of certain specified lines given the other three companies.

—— Mr. Russell A. Kinzie, of Batavia, N. Y., who was awarded the franchise for electric lighting, will immediately canvassthe business places to see what encouragement he will receive for private lights.

—— The Scranton Electric Light Company, owned by the Scranton Gas and Water Company, purchased 465 arc light dynamos of the Brush Electric Company some time last year. Since then they have purchased five additional 65 light Brush arc dynamos and now have a total capacity of 585 arc lamps. Their station is one of the best arranged stations in the country and their entire plant, including their street circuits, one of the most complete.

—— One of the largest orders ever taken for isolated electric lighting was recently booked by Mr. H. S. Conner, special agent for the Brush Electric Company of Cleveland. The order was placed by the great Wesson Mills, of Wesson, Miss., and consists of seven 45 light Brush arc light dynamos, 250 arc lamps, and plant for 200 incandescent lamps of the Brush system. Since the award of the original contract additions have been made so that the number of arc lights will be increased to over 300, thus constituting one of the largest mill plants in the world. The entire installation will be in working order in a few weeks.

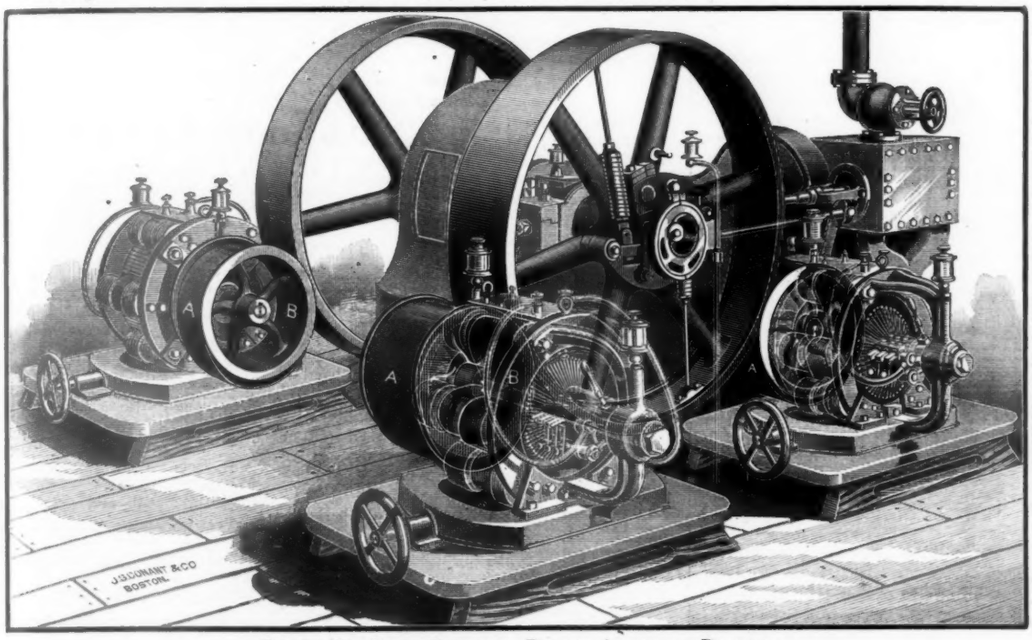


FIG. 1.—THE EVANS METHOD OF BELTING APPLIED TO DYNAMOS.

—— Alexander Kempt, Chicago agent of the Brush Electric Company, has just closed a contract with the city of Duluth, Minn., for a municipal arc lighting plant, consisting of two 60-light Brush dynamos, 120 double carbon Brush lamps, their appurtenances, and the construction work complete. The plant will be in operation in 60 days.

—— It is stated that Adams, Blodget & Company, of Boston, Mass., have taken $150,000 of six per cent. first mortgage bonds of the Kansas City Electric Light Company. Though they have had the bonds but a very short time they have already sold one-half of the amount. The Kansas City Electric Light Company has paid 10 per cent. dividends annually from the start, and since 1883 has not failed to earn 20 per cent. on its capital in any year. For the fiscal year of 1888 the net earnings were $68,833.98, or 34 per cent. on the then outstanding capital of $200,000. The capital stock is now $300,000, fully paid, and the principal stockholders are representative Kansas City business men of good standing and influence. The last quoted sale of the stock was at 110. The total property pledged to secure this issue of bonds is $475,479, the company's real estate, with improvements, being alone valued at $156,800, or more than the amount of the bonds.

—— There were two fatal cases in electric light circles last week. Mr. Darwin A. Henry, of the East River Electric Light Company, New York City, slipped from a ladder in the station and was killed by the shock from a 1,000-volt current. Hugh Ferry, a lineman at Buffalo, received so severe a shock from an arc light wire while on a pole, that he died a few minutes after he was taken down.

—— It is stated that a syndicate of moneyed parties in Massachusetts are reported perfecting a process for making the common illuminating gas by electricity. If it meets the claims set up for it, natural gas will have a formidable rival. Common petroleum is vaporized by means of heat caused by an electrical current through some metal. Two very material advantages are claimed for it. The leading one is its cheapness. The cost of manufacture is put as low as 17 cents per thousand feet. The other is the simplicity of the machine, which is said to not occupy more space than an office desk. This will furnish light, heat and power for a large manufactory at half the ordinary cost. If the expectations of the parties who are developing it are realized, it will be especially valuable to the communities that are burdened with a heavy expense in lighting and heating.

—— It will cost the gas and incandescent light company of Grand Forks, Dak., in the neighborhood of $40,000 to complete their intended erections and improvements at the rear of the Syndicate block.

—— The Brush Electric Company has received an order for, and has now nearly completed, another of the "Colossus" 500 horse power dynamos for the Cowles Electric Smelting and Aluminum Company. This is the third "Colossus" dynamo built. The other two have been in regular service continuously since their completion.

—— Electrician Fred Swan was testing the electric lighting apparatus at the Bijou theatre, Philadelphia, and he had the current turned on in two temporary arc lamps, when he was accosted by a young man who had come into the theatre in quest of a match to light his cigarette. Mr. Swan had no matches, and told the smoker so, and then turned away to do something else. A moment later he heard a yell. The young fellow was lying on his back with his hand to his mouth and a frightened-half-to-death look on his face. He had foolishly tried to take a light from the carbon of the unguarded arc lamp, and the shock struck him full in the mouth. He thought all his teeth were knocked out, and he thinks he won't have full use of his tongue for a month.

ELECTRIC LIGHT NEWS

—— Hingham, Mass., will soon substitute electricity for its present method of lighting by kerosene and gasoline.

—— The South Easton, Pa., Electric Light Company, South Easton, Northampton county, has been organized with a capital of $5,000.

—— An Edison electric light plant, with a capacity of 125 lights, has been placed in Forsyth's Elm City dye works of New Haven, Conn.

—— New Brush central stations have been organized during the past week at Waynesburgh, Penn.; Barrie, Ontario, Canada, and New Ulm, Minn.

—— The Brush Electric Light Company, of Detroit, Mich., has increased its already extensive facilities by the addition of two 60 light Brush machines and 120 arc lamps.

—— The wires for Port Chester's new electric lights are being strung throughout the village, and it is expected that the plant will be ready for operation by September 1st.

—— Huntingdon is the only town in Pennsylvania with a population of over 5,000 that has not the electric light, but the ancient borough is making arrangements to establish an electric plant.

—— The work on the station of the Media, Pa., Electric Light Company is progressing rapidly. Two engines and two dynamos will be put in position at once. The wiring of the streets has not yet been begun.

—— Work on the new electric light station at Fitchburg Mass., is being pushed rapidly, and the new wiring will be commenced in a week or 10 days. The new station will be opened early in November.

—— The Wainwright Manufacturing Company, of Boston, whose factory is in Medford, have placed an order with the Thomson-Houston Electric Company for a 200-light incandescent dynamo for lighting their shops.

—— The citizens of Bangor, Maine, congratulate themselves on the excellence of their lights. The city of Bangor installed the Brush system of arc lighting some time ago, and the plant was described in these columns. Since that time the city has ordered an additional plant from the Brush Company and the lights are giving satisfaction.

—— The contract for the new brick building of the Thomson-Houston Electric Company, on Centre street, West Lynn, Mass., will be given out in a few days. The building is to be 105x50 feet, three stories, and a basement of brick, with freestone trimmings. Masons are also making figures for the large chimney for the smelting and annealing building on Federal street.

—— The Boulder Electric Light Company, Boulder, Col., has purchased a prominent business location in the city, and will at once proceed to erect a large brick, iron roof, fire proof building for their electric light plant. The machinery-room will be 50x45 feet and the boiler-room 40x20 feet in size. An additional 100 horse-power engine is being put in at once, as the demand for light compels this addition without delay.

—— W. G. Ball, representative of the Westinghouse Incandescent Light Company, of Chicago, is placing a dynamo and lights in the glucose works at Venice, Ill., the works running full force at night as well as day. He will place 500 lights, of which 200 of 16 candle-power will be in the various rooms of the buildings, and 300 of 50 candle-power will be outside and on the buildings, lighting up the surrounding country for a considerable distance.

KINDRED INTERESTS

The Port Chester Gas Company, Port Chester, N. Y., recently contracted with the eastern office of the Brush Electric Company, 36 Union square, N. Y., for a central station plant of 75 arc lights. The installation work is now about completed and the lights will be turned on in a few days.

The Pond Engineering Company sold the Fort Scott Electric Light and Power Company, Fort Scott, Kans., a 125 horse-power Armington & Sims engine. This is the third engine which they have sold the Fort Scott Company within a very short time. They are also furnishing Guthire, Chase & Co., Milford, Iowa, a 50 horse-power Schutte exhaust steam condenser, complete with all pipe, valves, etc.

The Perkins Electric Light Company.—This company, though recently organized (314 Pearl street, Hartford, Conn.), has met with so popular a reception that an enlargement of factory facilities will be made at once. The Perkins lamp is widely and favorably known, and now that the company manufacture for all systems, its business has most rapidly increased. Mr. J. J. Gates, the secretary and active manager of the company, is to be congratulated on the successful business he has built up.

The Law Battery.—Mr. Wm. A. Child, president of the company engaged in manufacturing the Law battery, has issued a little pamphlet illustrating and describing the improved double cylinder battery. The publication is printed in colors, is sent out from the headquarters of the company at 112 Liberty street, and contains the endorsement of many well known telephone workers, such as J. C. Reilly, J. A. Seeley, Geo. F. Durant, D. I. Carson, etc. Prices and discount rates to the trade are included in the pamphlet.

Messrs. M. R. Muckle, Jr., & Co., representatives of the Westinghouse Electric Co., have secured the contract for lighting the new Spreckles sugar refinery at Reed street wharf, Philadelphia, by the Westinghouse alternating system, 2,250 lights. As this refinery is well known to contain only what is believed to be the most improved of modern machinery in every particular, Messrs. M. R. Muckle, Jr., & Co. naturally feel somewhat elated over their success in this matter. The engineers of the refinery, Messrs. Watson, Muller and Sieghortner, showed a spirit which is well worthy of imitation by those in similar positions when they made quite extended examinations of plants of various systems before making their report, and Mr. Spreckles' order was finally given on the fact that installations made by Messrs. M. R. Muckle, Jr., & Co. showed very superior work.

The Westinghouse Electric Co. are filling the following excellent showing of orders for central station alternating current apparatus during the month of August:—Dennison, Texas, 1,500; Newark, N. J., 750, inc.; Freeport, Ill., 750; Albion, N.Y., 500; Rutherford, N. J., 750; Marquette, Mich., 750; Schenectady, N. Y., 1,500; Elmira, N. Y., 750; Sprague, Wash., 500; Sewickley, Pa, 750; New York, N. Y., 6,000, inc.; Hartford, Ct., 1,500, inc.; North Yakima, Wash., 500; Providence, R. I., 2,000, inc. Total, 19,000 16 c. p. lights capacity. The following arc machines, for central station purposes, were also sold during the month:—Albion, Ill., 50 lights; Auburn, Ind., 35 lights; North Yakima, Wash., 35 lights. Total, 120 lights. Up to the first of September of this year, the orders for the Shallenberger meter aggregated 175,000 16 c. p. lights capacity. This is a strong endorsement of this meter which is being rapidly introduced among all their central stations. Its workings give general satisfaction.

Orders for New Arc and Incandescent Plants Received by the Brush Electric Company During the Past Month.

The following is a very fine showing of the business that this well-known company is receiving:

Barron, Forbes & Co., city of Mexico, Mex., 65 arc lights and dynamo; Perdue University, Lafayette, Ind., 10 arc lights and dynamo; Doggett Dry Goods Co., Kansas City, Mo., 50 arc and 250 incandescent lamps and dynamos for same; Mississippi Mills, Wesson, Miss., 360 arc and 150 incandescent lamps and dynamos for same; Citizens' Gas Light Co., Port Chester, N. Y., 55 arc lamps and dynamo; Navy Yard, Washington, D. C., 120 arc lamps and dynamos for same; Manhattan Electric Light Co., New York City, 260 arc lights.

INCANDESCENT PLANTS.—Charleston Cotton Mills, Charleston, S. C.; Pulp Mills, Waterville, Me.; Island Lumber Co., Sturgeon Bay, Wis.; A. J. Lawson, Montreal, Can.; Kilby Mfg. Co., Medicine Lodge, Kan.; Kilby Mfg. Co., Ness City, Kan.; Shawmut Fibre Co., Shawmut, Mo.

Motor Tests at Asheville, N. C.

Quite an interesting test was made on one of the Sprague improved electric motors at Asheville, N. C., recently.

The Asheville Street Railway Company, which are now operating four cars on the Sprague electric system, recently purchased two of the Sprague improved electric motors for the equipment of the new street car which they had decided to add to their system. Although it was intended to equip the car with two motors, as the grades are quite steep, the question was raised as to what the results would be if only one motor was placed upon the car and obliged to do the whole work. In order to test this question, on August 6th of last month the car, equipped with only one motor, was started over the line, and frequent readings of an ampere meter were taken in order to determine the power used on different portions of the line. At the same time that the ampere meter readings were taken, voltmeter readings were taken in order to make certain that the potential was maintained.

In all, three trips over 4,000 feet of the worst part of the line were made; twice with nine passengers on the car in order to test the apparatus, and once with 43 passengers. On the last trip the passengers were chosen from among the bystanders, and the heaviest men were selected, so that the total weight of the car and load was certainly over 14,000 pounds. The difference in elevation in the distance of 4,000 feet was 185 feet. Upon the distance traversed were two reverse curves and three other curves, all of which were on grades, both reverse curves being on heavy grades with one radius of 50 feet. The curves were all dry and dusty. The length of wheel base was nine feet, so that a large amount of power was required in going around the curves. Besides these and other difficulties the journals of the car had not worn smooth, the car being entirely new, and seemed very stiff, as it would not roll without being started on grades very much heavier than those on which the old cars habitually started by gravity.

During the entire run the freedom from sparking was perfect, and when the amount by which the capacity of the machine was exceeded is taken into account, this point was truly remarkably. The car ran at a speed of about nine miles an hour.

The amount of horse power required to raise the load against gravity alone for the distance attained is about 12 horse-power, and adding the friction in the journals, on the track and elsewhere, the ampere readings showed that the motor, although working over 50 per cent. above its normal capacity, did the work at an extremely high efficiency. At the end of the three trips the motor, although hotter than one would like in every day work, was by no means excessively hot, and showed no harmful results from the result of the trip.

Electrical Execution Denounced in the American Social Science Association.

[From Dr. Peterson's Paper in the *Tribune*.]

The most cogent argument that I can urge against electricity as a death penalty is the complexity of apparatus required in comparison to the simple instruments for hanging or beheading. The dynamo must be in good order; the machinery, the running gear, must be carefully adjusted; the wires perfectly insulated and guarded from unwary spectators; the electrodes in perfect juxtaposition; the skin and poles well moistened; the prisoner securely bound; the electro-motive force determined to be adequate; the continuity of the circuit ascertained to be unbroken; the contact made for the requisite period of time by a firm, trained hand.

Then, after all has been superintended with extraordinary care by one or two expert electricians, how easily could some part become disarranged and the prisoner made to endure an eternity of delay upon the brink of death, or caused to suffer some physical torture a trifle less exquisite.

Suppose that all is in complete readiness, the contact is made, the victim instantly becomes unconscious and rigid; he has ceased to breathe; his ventricles beat no longer. But if a break should occur after the first two or three seconds, would life always be so soon extinguished? Probably not. Hence for from 15 to 20 seconds the current must be made to flow, until reawakening is placed beyond all further possibilities.

Now, this is not the ideal method that arose in the imaginations of the founders and projectors of this law. This is not the thunderbolt falling unexpectedly and suddenly, with a speed swifter than light, severing in a fraction of a second the vital force that holds conscious spirit and unconscious clay together.

Decreasing the Gas Dividends.

Some interesting events have recently taken place at Southbridge, Mass., where the gas company is reported as paying back excess charges to several companies, the result of false meter returns, which are excused as errors of the bookkeeper, and as of course gas meters are always correctly taken, this is probably a truthful excuse; but the little circumstance has been very entertaining to the Southbridge Electric Company, which is a rival in that town in the lighting business.

The gas company had at one time an option to purchase the electric plant, in which the Thomson-Houston systems are used, but for reasons best known to itself decided not to do it. The plant then passed into the hands of some of the leading citizens in Southbridge, who have taken hold of it with a will and are making it a success.

The gas company has always paid eight per cent. dividends until last January, when it passed its dividends, but declared six per cent on April. The prominent directors of the gas company have placed many of the citizens of Southbridge under great obligation to them for explaining correctly and exactly the profits which the electric company are making, and showing how utterly impossible it is for the company to do business and make any money, and have pointed with considerable pride to the fact that they were paying dividends and had reduced the price of gas, their last reduction being to $2.50 per thousand, with 10 per cent. discount on all persons who burn 2,000 feet or over.

The same citizens who were told so confidentially of what the electric company could not do and what the gas company could do, are reflecting since the recent error in taking meters, whether the gas company had actually a thorough knowledge of its own business.

WANTED.— Chief Engineer for electric light plant of 2,000 horse-power; electrical knowledge not necessary. Address, with references, **COMPETENT,** ELECTRICAL REVIEW.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING SEPT. 3, 1889.

410,150 Electric conduit; Henry A. Chase, Boston, Mass.

410,153 Apparatus for automatically charging secondary batteries; Stanley C. C. Currie, Philadelphia, Pa., assignor to United Improvement Company, Gloucester City, N. J.

410,170 Regulation of coupled dynamos; Osborn P. Loomis, New York, N. Y., assignor to Loomis Electric Manufacturing Company, same place.

410,180 410,182 410,183 410,184 Electrically controlled elevator; Chas. E. Ongley, New York, N. Y., assignor to Hydraulic Elevator Company, of Illinois.

410,189 Electric gong; Jas. H. Phalan, Ansonia, Conn., assignor to Electrical Supply Company, same place.

410,264 Electric railway plow; Francis O. Blackwell, New York, N. Y.

410,276 Method of neutralizing the residual magnetism in electro-magnets; Freidrich Hænichen and Otto Hænichen, Philadelphia, Pa., assignors to themselves and Oscar Seebass, New York, N. Y.

410,305 Telegraphphones; Malone Wheless, Nashville, Tenn., assignor by direct and mesne assignments to the World Telegraphphone Company, of West Virginia.

410,318 Fire alarm system; William L. Denio, Rochester, N. Y.

410,410 Apparatus for applying sheaths to electrical conductors; Charles Q. Goodwin, Malden, Mass.

410,468 Reaction and induction coil; Elihu Thomson and Edwin W. Rice, Jr., Lynn, Mass.

410,493 Electric arc lamp; Robt. L. Cohen, Camden, N. J., assignor of one half to William F. Anderson, Philadelphia, Pa.

$1,000 REWARD.

I WILL PAY $500 for information sufficient to effect the discovery and conviction of the thief who broke open my desk at my office and stole therefrom papers and documents, alleged copies of some of which were published in the New York *Sun* of August 25, 1889. I will also pay $500 additional for the return of the stolen property.

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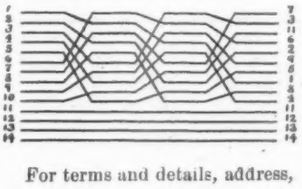

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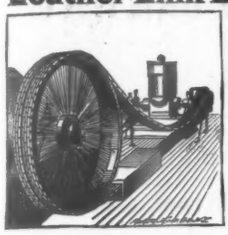

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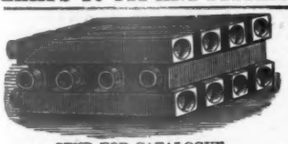

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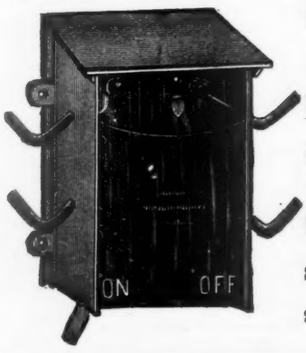

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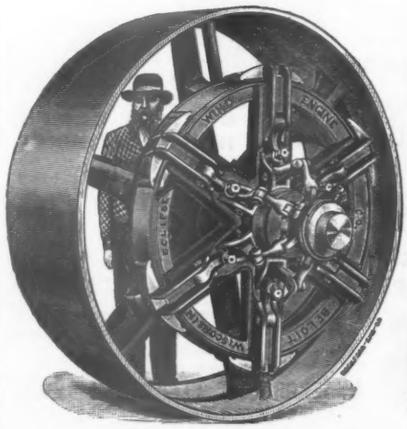

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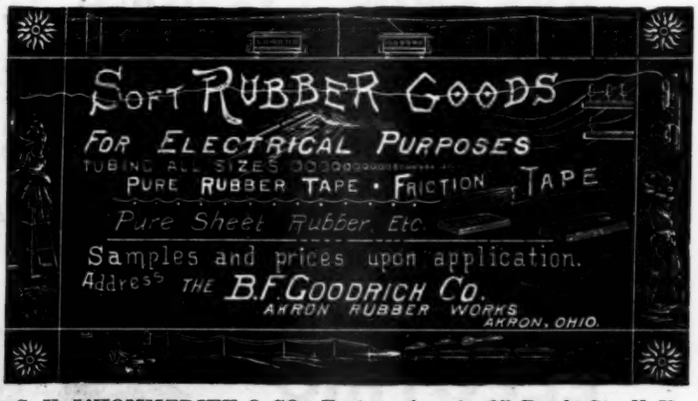

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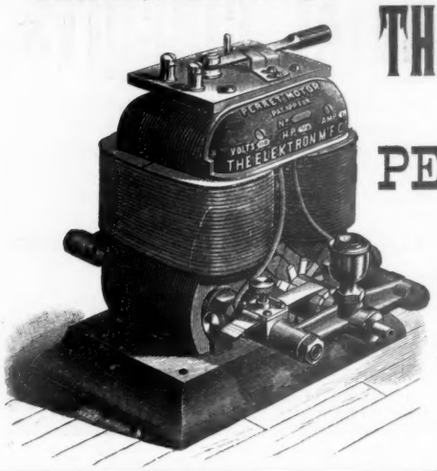

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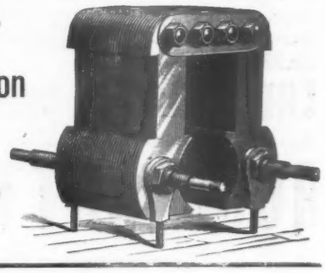

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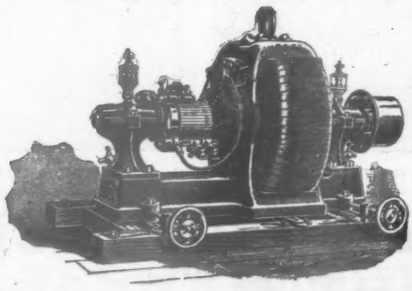

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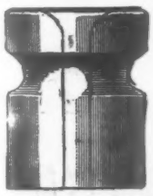

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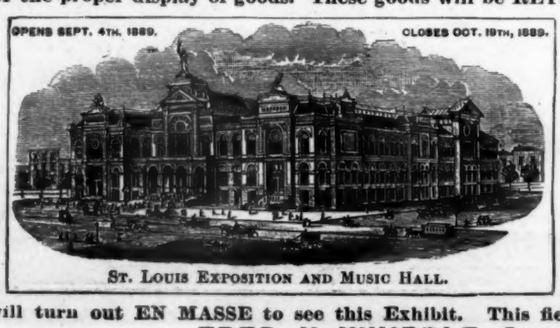

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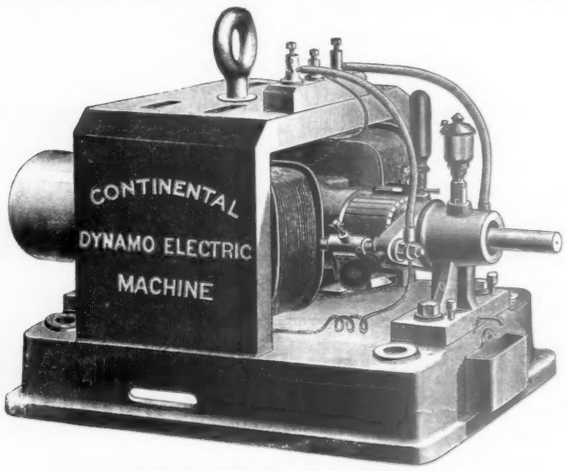

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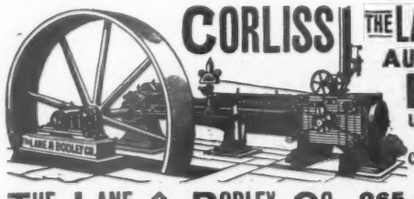

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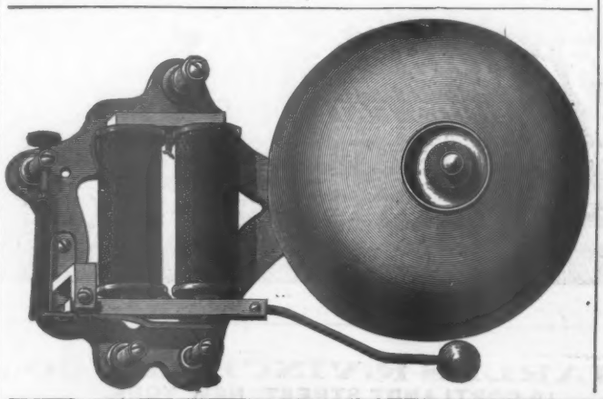

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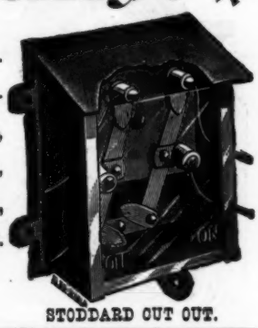

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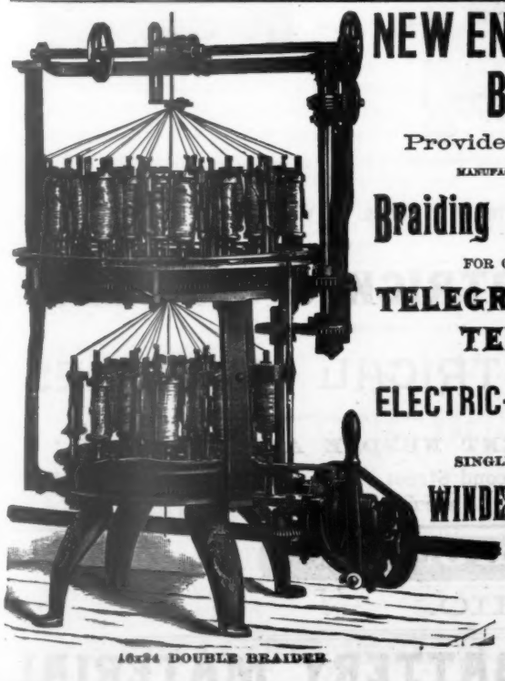

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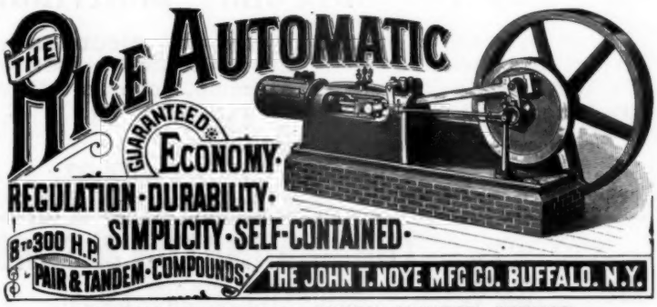

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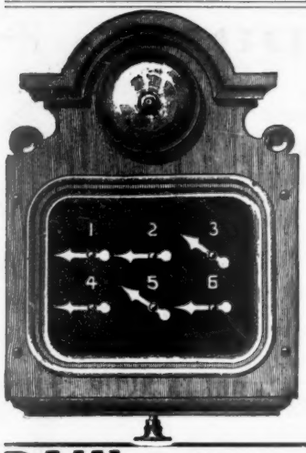

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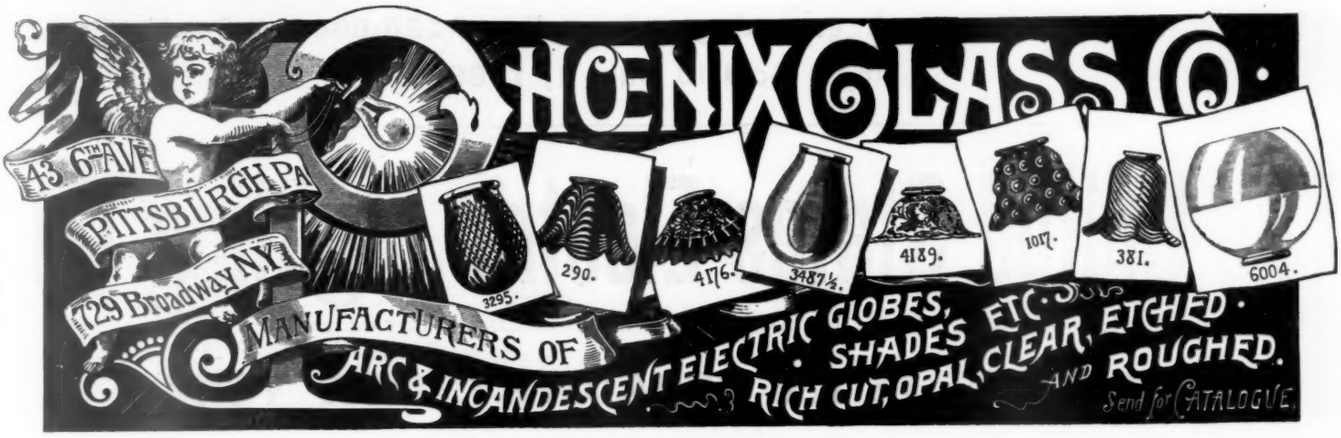

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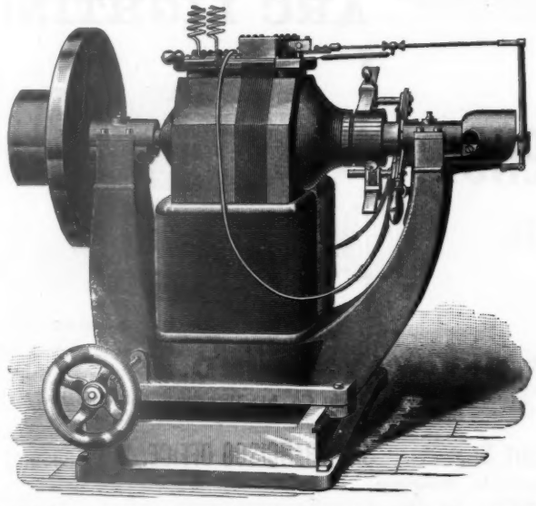

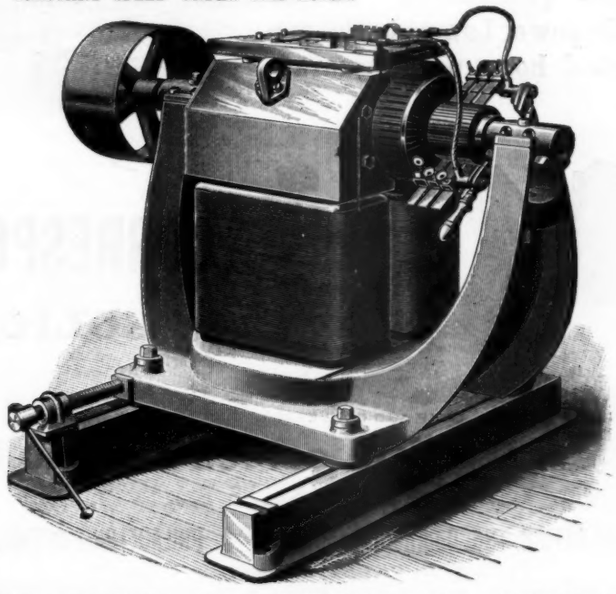

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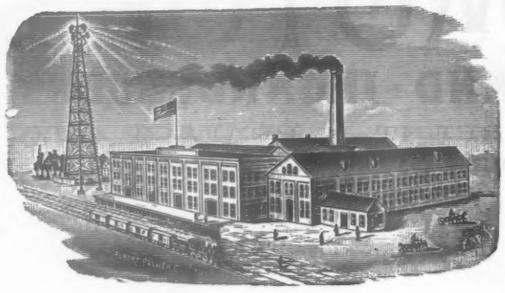

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